DRAFT

SOFTWARE REQUIREMENTS SPECIFICATION (SRS)

FOR THE

DEFENSE INFORMATION INFRASTRUCTURE (DII)
COMMON OPERATING ENVIRONMENT (COE)

DATA ACCESS SERVICES (DAS)

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Prepared by
DII COE AOG Data Access Services Technical Working Group (DATATWG)
Tayna Buck, Chair

Prepared For
Defense Information System Agency (DISA)

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DA 1 SCOPE

DA 1.1 IDENTIFICATION OF FUNCTIONAL AREA

This Software Requirements Specification (SRS) establishes the functional, performance, and verification requirements for the Data Access Services (DAS) functional area of the Defense Information Infrastructure (DII) Common Operating Environment (COE). The DAS functional area includes File Access, File Management, Database Access, and Database Management.

DA 1.2 FUNCTIONAL AREA OVERVIEW

Data Management provide a set of consistent client-server oriented data administration and data management services for mission and support applications. These services isolate vendor-unique implementations of data access and provide applications a means of avoiding dependencies on physical access models. These services also provide data management functions for access to distributed (local and remote) database management systems.

DA 1.2.1 Data Management Capabilities

Data Management functions are divided into two areas: File Access and Database Access. File Access provides the capability to develop COE infrastructure and mission applications which are file system independent and portable across UNIX (POSIX) and Windows hardware platforms. The File Access functions are a common set of capabilities (open, close, rename, and etc.) available across the target platforms, while providing hooks to access hardware unique functions as required. These services define file naming standards and validation routines to prevent the creation of filenames which contain non-portable characteristics. These services are available for distributed (local and remote) operations.

Database Access functions are a common set of capabilities (open database, select database, rename, insert, query and etc.) available across the target platforms, while providing hooks to access database and hardware unique functions as required. Database Access addresses the use of Data Manipulation Language (DML) and Data Definition Language (DDL) as well as the selection of the SQL interfaces to be supported.

DA 1.2.2 Data Administration Capabilities

Data Administration functions are divided into two areas: File Administration and Database Administration. File Administration functions are a common set of capabilities (backup, archive, restore, and etc.) available across the target platforms, while providing hooks to access hardware unique functions as required. These services are available for distributed (local and remote) operations.

Database Administration functions are a common set of capabilities (archive database, import, export, and etc.) available across the target platforms, while providing hooks to administer databases. Database Administration addresses the use of DDL, access to data, location of the data, and the distribution of data.

DA 1.3 DOCUMENT OVERVIEW

This document outlines the software capabilities required for the (DAS) module for the DII COE. Section 2 lists the documents which are applicable to this specification. Section 3 provides a list of functional capabilities. Section 4 identifies the qualification requirements. Section 5 outlines the requirements and verification traceability matrix. Section 6 contains the applicable notes associated with the DAS Module. Note: in the next revision, all requirements in this section that are covered by the SQL standard will be deleted. A pointer to the appropriate SQL standard will be provided.

DA 2 APPLICABLE DOCUMENTS

DA 2.1 GOVERNMENT DOCUMENTS

SPECIFICATIONS:

ACCS-A1-100-006	System Specification for ATCCS, 22 March 1995
ATCCS-A1-302-001A	Army Tactical Command and Control System Common ATCCS Support Software (CASS) Systems/Segment Specification
CDRL A142	AWIS Software Requirements Specification (ASRD), July 1992
CDRL ML03	AWIS Systems Management Manual (SMM), 31 Oct. 1994
	AWIS Support Software Design Document, December 1994
D18664A	Standard Theater Army Command and Control System (STACCS) System Design Document Version 1.1/As Built, 1 Oct. 93
AAN-SDA001A	Standard Theater Army Command and Control System (STACCS) System Specification, Version 1.1/As Built, 1 Oct. 93
	Standard Theater Army Command and Control System (STACCS) System Software Programmers Manual, Draft.
	Global Command and Control System (GCCS) Integration Standard, Version 1.0, October 1994.
	Global Command and Control System (GCCS) Common Operating Environment Baseline, DISA, 28 November1994.

User Interface Specifications for Global Command and Control System (GCCS), Version 1.0, October 1994.

Draft Architectural Design Document for the Global Command and Control System (GCCS) Common Operating Environment (COE), Version 3, 24 July, 1994.

STANDARDS:

MIL-STD-498 Military Standard - Software Development and Documentation, DOD, Dec. 1994.

FIPS PUB 127-2 Database Language SQL - Federal Information Processing Standards Publication 127-2, 2 June, 1993.

DA 2.2 NON-GOVERNMENT DOCUMENTS

Petrucci, Steve, "Cross-Platform Power Tools, Application Developers for the Macintosh, Windows, and Windows NT", Random House Electronic Publishing, 1993.

Donald Lewine,"POSIX Programmer's Guide", O'Reilly & Associates, Inc. 1991.

DA 3 REQUIREMENTS

DA 3.1 REQUIRED STATES AND MODES

The DAS will need to satisfy different requirements dependent on its mode or state of operation.

DA 3.1.1 **Modes**

Modes are defined in terms in three categories:

1. environment in which the data management services are used
2. end user purpose for which the data management services are used
3. database implementation

DA 3.1.1.1 **Environmental Mode of Operation**

Operation in varying environmental conditions requires different data management service capabilities.

DA 3.1.1.1.1 In the fixed (static) mode of operation (base or data processing megacenter), the data management services shall have the capability of being tuned by on-site personnel to adjust for varying workloads and sizes of associated databases. These workloads and databases are expected to change more frequently and to a greater extent than for processing associated with deployed units.

DA 3.1.1.1.2 In a changing (dynamic) environment, such as with deployed units, the workload and database sizes may be more predetermined (given a more precise mission) and require access to fewer data management administrative capabilities than needed in a fixed environment. The DAS shall have the ability to redefine or reset names of connect descriptors to database server instances. Connect descriptors are fully qualified object names and include address (protocol/host/port) and instance name.

DA 3.1.1.1.3 In a degraded communications environment, there is a need, for example, to be able to reset session time-out values if the data management services are being accessed by users affected by the communications degradation. At a minimum, the session time-out values shall be user definable and be able to be reset prior to initialization of a user session. The goal is to provide the option of dynamically changing session time values based on current communications performance identified by capabilities of the network management or DBMS.

DA 3.1.1.2 **Usage Mode**

The data management services will be used by various classes of users. Some of these uses of the data management services will entail unique requirements.

DA 3.1.1.2.1 In support of production processing, the DAS shall provide capabilities for backup and restore managed databases. The DAS shall include on-line backup and restore capabilities. Also, the DAS shall allow for backup and restore of varying parts of managed databases (e.g., tablespaces, tables, full). Recovery from a DBMS instance failure shall be handled by process of the DBMS and minimize database access lockout during recovery to the extent feasible.

DA 3.1.1.2.2 In support of development activities, the DAS shall provide access to the developers for making changes to DBMS resources. The DAS shall also provide development tools, including debug, trace, and other analysis capabilities to assist developers in producing optimized code. Backup and recovery capabilities are not required.

DA 3.1.1.2.3 In support of testing and quality assurance activities, the data management services shall provide capabilities to handle test cases in managed databases that are sized adequately to be representative of the production processing conditions. The DAS capabilities shall also be able to provide analyses of performance. In addition, the capability to test backup and recovery is required.

DA 3.1.1.2.4 In support of training activities, the data management services shall provide for the same processing as would be encountered in a production environment. However, access to the database may be via a training application access to the DBMS rather than from the production mission application.

DA 3.1.1.3 Database Implementation.

The data management services shall support managing various types of database architectures and platform implementations.

DA 3.1.1.3.1 Single Application Database. Data management services is required for data of an application that is completely contained in a single DBMS instance.

DA 3.1.1.3.2 Multiple Application Databases. Data management services is required for data of an application that are distributed among two or more instances. Distribution of data among different database instances (a fragmented/federated database) requires data management capabilities for location and methods of access to associated instances.

DA 3.1.1.3.3 Platforms Hosting DBMS Instance. Data management services is required to permit multiple instances to be installed on a single server platform, each instance managing a database (data segment of one or more applications). The single server platform could be based on a single CPU, multiple CPUs, or a clustered set of platforms (each platform with one or multiple CPUs). It is expected that the implementation of a data server on a clustered set of platforms will occur primarily in fixed environments. Performance tuning of multiple instances on a single server platform shall be performed in such a manner as to not result in significant negative impact on the performance of other instances.

DA 3.1.2 States

Data management services require capabilities for making modifications to the DBMS instance or to the data in the databases managed by the DBMS. These maintenance activities include: adding additional application data segments, adding users or changing user privileges, and restructuring storage and memory areas. These states of data availability that shall be supported by the data management services are defined as follows.

Shutdown: the DAS instance is closed. This state is required, for example, so that changes can be made to instance parameters contained in initialization and configuration files. Some maintenance activities may need only be possible to accomplish in this state.

Open Not Mounted: The DAS server instance is available but the database is not accessible. This state is used for creating the database (DII SHADE data segments) to be managed by the instance.

Open Mounted: The DAS server instance and managed database is available for all authorized general users based on assigned user access rights (profiles).

Online/Off-line: The DAS shall provide capabilities for taking individual objects off-line and putting them back online without performing a complete shutdown of the database instance. This requirement is needed to permit, for example, backup on individual tablespaces.

DA 3.2 DATA ACCESS SERVICES CAPABILITY REQUIREMENTS

DA 3.2.1 Data Management Requirements

DA 3.2.1.1 File Access Requirements

The File Access function provides a capability to develop COE infrastructure and mission applications which are file system independent and portable across DII COE approved hardware platforms. The File Access function is low level in nature and provides a layer which buffers COE infrastructure and mission applications from the operating system. The File Access function provides security mechanisms to prevent the unauthorized access to classified or sensitive information contained within file system files. Figure 3.2.1.1-1 shows a Mission Application which utilizes these services.

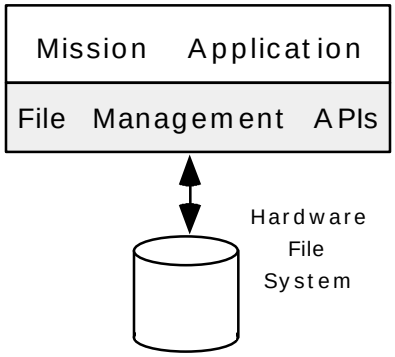

Figure 3.2.1.1-1 File Access Function Layer

DA 3.2.1.1.1 Cross Platform Portability

DA 3.2.1.1.1.1 The DAS shall be able to work with files which range in size from 0 bytes to the largest file size supported across all DII COE approved platforms. Four gigabytes is the largest file size portable across all DII COE approved platforms.

DA 3.2.1.1.1.2 The DAS shall support 32 bit file access formats. The 32 bit file format is standard across all DII COE approved platforms.

DA 3.2.1.1.1.3 The DAS shall be able to read and write variable size file blocks. The default block size varies from operating system to operating system. The DAS shall allow parameters to define the block size.

DA 3.2.1.1.1.4 The DAS shall provide a cross-platform file structure which will allow machines of different architectures and capabilities to determine the file's characteristics. Table 3.2.1.1.1-1 summarizes each of the attributes contained within the cross-platform file structure.

Component	Description
handle	Handle to the file
memory	Memory block containing the file name and path
type	The file type
error	The most recent error condition
bytes	The number of bytes actually read or written, only valid immediately after a read or write operation
attributes	Attributes assigned to the file, for example read-only or hidden. File access options, for example truncate/append or text/binary. The file creator, which application created the file.

Table 3.2.1.1.1-1 Cross Platform File Structure

DA 3.2.1.1.1.5 The DAS shall support big-endian (byte 0 is the most significant) and little-endian (byte 0 is the least significant) byte swapping. Various machines have different architectures which store data differently. The File Management Services shall provide the ability to specify a parameter which will order the Most Significant Bit(MSB) .

DA 3.2.1.1.1.6 The DAS shall provide support for maintaining alphanumeric case sensitivity of file name. The POSIX Operating System maintains case sensitivity.

DA 3.2.1.1.2 Functional Capabilities

DA 3.2.1.1.2.1 The DAS shall support the subset of file management functions which exist across the DII COE approved system standards and platforms. These functions shall work with both local and remote files. Table 3.2.1.1.2-1 lists functions cross referenced against POSIX and Windows Operating Systems.

Function	POSIX	Windows 95	Win32
create	creat()	CreateFile	CreateFile or _lcreate
delete	unlink()	DeleteFile	DeleteFile
rename	rename()	MoveFile	MoveFile
file size	stat()	GetFileSize	GetFileSize
get attributes	stat()	GetFileAttributes	GetFileAttributes
set attributes	fcntl()	SetFileAttributes	SetFileAttributes

open	open()	CreateFile OpenFile	CreateFile OpenFile _lopen
close	close()	CloseHandle	CloseHandle _close
read	read()	ReadFile	ReadFile _lread _hread
write	write()	WriteFile	WriteFile _lwrite _hwrite
open file dialog		GetOpenFileNam	GetOpenFileName
save file dialog		GetSaveFileName	GetSaveFileName

Table 3.2.1.1.2-1 File Access Functional Cross Reference

DA 3.2.1.1.2.2 The DAS shall provide a capability to simultaneously access files in read-only mode.

DA 3.2.1.1.2.3 The DAS shall provide the capability to create and access files with read, write and execute parameter associations.

DA 3.2.1.1.2.4 The DAS shall provide auditing mechanisms for tracking the time and identity of the user or application which is accessing a file. This data will be written to the DII COE audit file. This capability should be able to be enabled or disabled utilizing security administration tools. (Cross reference with the Security Administration SRS).

DA 3.2.1.1.3 File System Formats

The DAS uses the File Access functions described above in the Functional Capabilities Section. These functions can be applied utilizing multiple disk file formats. These formats are described in the requirements listed below and provide DII COE the broad spectrum of file types necessary to produce a functional system.

DA 3.2.1.1.3.1 The DAS shall have the capability to read and write text files. Text files are human readable files based upon the standard and extended ASCII character set.

DA 3.2.1.1.3.2 The DAS shall have the capability to use binary files. A binary file is one that is in a specific application format or is directly machine readable. They typically cannot be directly read by humans. There are some specific forms of binary file which are pertinent to DII COE. These binary file types are: Compressed files, Encrypted Files, and Library Files.

DA 3.2.1.1.3.3 The DAS shall have the capability to compress files using DII COE-approved compression algorithms. Compressed files are used to save space when not in use or to reduce file size for file transfer and storage. The DAS shall uncompress a file prior to the retrieval of data.

DA 3.2.1.1.3.4 The DAS shall have the capability to encrypt files using the DES encryption or other specified algorithm. Encrypted files are files which have been encoded with a security key to prevent unwarranted access to the contents of the file. (Cross reference with the Security Administration SRS).

DA 3.2.1.1.3.5 The DAS shall have the capability to create and utilize library files. Libraries provide an efficient method for storing and maintaining different types and amounts of data.

DA 3.2.1.1.4 File Feature Specification

DA 3.2.1.1.4.1 The DAS shall support standard file feature specifications. These specifications listed in Table 3.2.1.1.4-1 provide an easy cross reference for determining common file formats.

File Feature	POSIX	Windows 95	Windows NT	Common Format
name	255 A-Z a-z._- characters	255 Unicode characters	255 Unicode characters	255 A-Z a-z._- characters
directory	255 A-Z a-z._- characters	255 Unicode characters	255 Unicode characters	255 A-Z a-z._- characters
volume	none	1 character A-Z	1 character A-Z	none
path	Parameter (e.g. 1024)	arbitrary	arbitrary	Parameter

Table 3.2.1.1.4-1

DA 3.2.1.1.4.2 The DAS shall provide support for using valid characters and separators for file names. Table 3.2.1.1.4-2 depicts each file feature and the valid values.

File Feature	POSIX	Windows 95	Windows NT	Common Format

case sensitivity	case is maintained	all characters converted to upper case	case is maintained	case is maintained
valid separators	/ for path	: for volume / for path	: for volume / for path	/ for path
disk volume identifiers	none	A through Z	A through Z	none
invalid name characters		*?/\+.,SPACE";<>={}|	:/*?<>|"	*?/\+.,SPACE";<>={}|

Table 3.2.1.1.4-2 Valid Characters and Separators

DA 3.2.1.1.5 Directory Services

The DAS provides directory services. Directory services provide a mechanism for applications to search, traverse, or query a directory tree. Directory services provide the capability to access both local and remote files systems. Directory services functionality is described in the requirements below.

DA 3.2.1.1.5.1 The DAS shall provide the capability to get directory information.

DA 3.2.1.1.5.2 The DAS shall provide support for hidden files.

DA 3.2.1.1.5.3 The DAS shall provide the capability to get the current directory.

DA 3.2.1.1.5.4 The DAS shall provide the capability to traverse the directory tree.

DA 3.2.1.1.5.5 The DAS shall provide the capability to get a list of files in a directory.

DA 3.2.1.1.5.6 The DAS shall provide the capability to access data files identified by logical, not physical, file names.

DA 3.2.1.1.5.7 The DAS shall provide the capability to access local and remote data files.

DA 3.2.1.2 Database Access Requirements

The DAS Database Access function consists of the following major capabilities:

- Database Services
- Application Generation
- Distributed Database Services
- Data Dictionary Services

The DAS Database Access function encapsulates the capabilities, services, and functionality to be implemented. It provides capabilities supported by COTS products within a client-server relational database environment. These basic services will be accessed by the application using public Application Programming Interfaces (APIs). This technique will ensure the applications a means of decoupling from the vendor unique implementations of their COTS database management products.

DA 3.2.1.2.1 Database Management Services Capabilities

DA 3.2.1.2.1.1 The DAS shall process ANSI standard SQL as specified in FIPS PUB 127-2.

DA 3.2.1.2.1.2 The DAS shall support processing of SQL statements embedded in an application program.

DA 3.2.1.2.1.3 The DAS shall provide the capability to create named sequences of SQL statements at the request of an application program.

DA 3.2.1.2.1.4 The DAS shall provide the capability to modify named sequences of SQL statements at the request of an application program.

DA 3.2.1.2.1.5 The DAS shall provide the capability to save named sequences of SQL statements at the request of an application program.

DA 3.2.1.2.1.6 The DAS shall provide the capability to execute named sequences of SQL statements at the request of an application program.

DA 3.2.1.2.1.7 The DAS shall provide the capability to delete named sequences of SQL statements at the request of an application program.

DA 3.2.1.2.1.8 The DAS shall provide the capability to commit database transactions.

DA 3.2.1.2.1.9 The DAS shall enable mission applications, as well as other COE components, to use stored procedures.

DA 3.2.1.2.1.10 The DAS shall support the notification of applications when a database transaction cannot be performed.

DA 3.2.1.2.1.11 The DAS shall provide the capability to rollback database transactions.

DA 3.2.1.2.1.12 The DAS shall provide capabilities which monitor for the occurrence of conditions established by the application. These capabilities shall also include the ability to notify the appropriate application processes when these conditions are satisfied.

DA 3.2.1.2.1.13 The DAS shall provide the capability to create and add configuration information utilizing unique identifiers such as Configuration ID, Configuration Entry ID to identify the configuration data itself as well as the configuration entry data.

DA 3.2.1.2.1.14 The DAS shall provide the capability to save the configuration entry information.

DA 3.2.1.2.1.15 The DAS shall provide the capability to delete after confirmation, the configuration entry as specified by a unique configuration entry identifier.

DA 3.2.1.2.1.16 The DAS shall provide the capability to maintain mapping between logical database identifiers and physical locations to provide local transparency.

DA 3.2.1.2.1.17 The DAS shall provide the capability to use multiple local and remote databases concurrently.

DA 3.2.1.2.1.18 The DAS shall provide the capability to create multiple configurations of logical databases.

DA 3.2.1.2.1.19 The DAS shall provide the capability to modify multiple configurations of logical databases.

DA 3.2.1.2.1.20 The DAS shall provide the capability to delete multiple configurations of logical databases.

DA 3.2.1.2.1.21 The DAS shall provide the capability to add or delete databases on different hosts (nodes on the network) dynamically.

DA 3.2.1.2.1.22 The DAS shall provide a common Graphical User Interface (GUI) for all DAS tools.

DA 3.2.1.2.1.23 The DAS shall provide the capability for asynchronous operations so that client request are queued and sent when the connection is available and responses are also queued.

DA 3.2.1.2.1.24 The DAS shall provide the capability for suspended / disconnected client operations. ****Examples to be added, SUSPENSE: PM IF****

DA 3.2.1.2.1.25 The DAS shall provide the capability for unsolicited data alerts which provides for incoming request to become available when received.

DA 3.2.1.2.1.26 The DAS shall provide the capability for "auto-configuration" which provides an uniform registration system for application agents and client. ****Sample attributes to be added, SUSPENSE: PM IF ****

DA 3.2.1.2.1.27 The DAS shall provide the capability to work with different RAID modes.

DA 3.2.1.2.1.28 The DAS shall provide the capability to load multimedia.

DA 3.2.1.2.1.29 The DAS shall provide the capability to store multimedia.

DA 3.2.1.2.1.30 The DAS shall provide the capability to query multimedia.

DA 3.2.1.2.1.31 The DAS shall provide the capability to delete multimedia.

DA 3.2.1.2.1.32 The DAS shall provide the capability to update multimedia.

DA 3.2.1.2.1.33 The DAS shall provide the capability to load full motion.

DA 3.2.1.2.1.34 The DAS shall provide the capability to store full motion.

DA 3.2.1.2.1.35 The DAS shall provide the capability to query full motion.

DA 3.2.1.2.1.36 The DAS shall provide the capability to delete full motion.

DA 3.2.1.2.1.37 The DAS shall provide the capability to update full motion.

DA 3.2.1.2.1.38 The DAS shall provide the capability to load full screen video.

DA 3.2.1.2.1.39 The DAS shall provide the capability to store full screen video.

DA 3.2.1.2.1.40 The DAS shall provide the capability to query full screen video.

DA 3.2.1.2.1.41 The DAS shall provide the capability to delete full screen video.

DA 3.2.1.2.1.42 The DAS shall provide the capability to update full screen video.

DA 3.2.1.2.1.43 The DAS shall provide the capability to load high fidelity audio.

DA 3.2.1.2.1.44 The DAS shall provide the capability to store high fidelity audio.

DA 3.2.1.2.1.45 The DAS shall provide the capability to query high fidelity audio.

DA 3.2.1.2.1.46 The DAS shall provide the capability to delete high fidelity audio.

DA 3.2.1.2.1.47 The DAS shall provide the capability to update high fidelity audio.

DA 3.2.1.2.1.48 The DAS shall provide Ada interfaces for all public APIs.

DA 3.2.1.2.1.49 The DAS shall provide the capability to issue SQL statements through API function calls.

DA 3.2.1.2.1.50 The DAS shall provide data access to heterogeneous databases in accordance with Remote Data Access (RDA) Standards.

DA 3.2.1.2.2 Application Generation

DA 3.2.1.2.2.1 Application Generation Capabilities

DA 3.2.1.2.2.1.1 The DAS shall provide the capability to create data entry forms using a standard forms generation language.

DA 3.2.1.2.2.1.2 The DAS shall provide the capability to modify data entry forms using a standard forms generation language.

DA 3.2.1.2.2.1.3 The DAS shall provide the capability to delete data entry forms using a standard forms generation language.

DA 3.2.1.2.2.1.4 The DAS shall provide the capability to create reports using a standard report specification language.

DA 3.2.1.2.2.1.5 The DAS shall provide the capability to modify reports using a standard report specification language.

DA 3.2.1.2.2.1.6 The DAS shall provide the capability to delete reports using a standard report specification language.

DA 3.2.1.2.2.1.7 The DAS shall provide the capability to embed API function calls in forms and report generation language specifications.

DA 3.2.1.2.2.1.8 The DAS shall provide the capability to integrate database objects including (but not limited to) maps, overlays, documents, reports, messages, and images.

DA 3.2.1.2.2.2 Database Query Processing

DA 3.2.1.2.2.2.1 The DAS shall provide the capability to query for data records in the database.

DA 3.2.1.2.2.2.2 The DAS shall provide the capability to create queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.

DA 3.2.1.2.2.2.3 The DAS shall provide the capability to modify queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.

DA 3.2.1.2.2.2.4 The DAS shall provide the capability to store queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.

DA 3.2.1.2.2.2.5 The DAS shall provide the capability to delete queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.

DA 3.2.1.2.2.2.6 The DAS shall provide the capability to recall queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.

DA 3.2.1.2.2.2.7 The DAS shall provide the capability to store the results of an ad hoc query as a system file.

DA 3.2.1.2.2.2.8 The DAS shall provide the capability to execute ad hoc (e.g. relational, spatial, combined) database queries.

DA 3.2.1.2.2.2.9 The DAS shall provide the capability for multiple local and remote application programs to concurrently query a database instance.

DA 3.2.1.2.2.2.10 The DAS shall provide the capability for application programs to query multiple local and remote databases concurrently.

DA 3.2.1.2.2.3 Database Backup and Restore Processing

DA 3.2.1.2.2.3.1 The DAS shall be able to compress all the data offloaded at the user's discretion and automatically decompress all the restored data when the DAS detects that the user is attempting to restore compressed data.

DA 3.2.1.2.2.3.2 The DAS shall archive data at the user's discretion and restore the data when directed.

DA 3.2.1.2.2.3.3 The DAS shall provide to the application on request an audit report containing all records that were rejected during the offload or during the load. The report shall indicate the reason each record was rejected.

DA 3.2.1.2.2.4 Performance Optimization

DA 3.2.1.2.2.4.1 The DAS shall provide the capability to optimize data traffic to improve communication performance.

DA 3.2.1.2.2.4.2 The DAS shall provide the capability to reduce the size of data messages.

DA 3.2.1.2.2.4.3 The DAS shall provide the capability to optimize data queues.

DA 3.2.1.2.2.4.4 The DAS shall provide the capability to optimize SQL statements.

DA 3.2.1.2.2.5 Database Journal Processing

DA 3.2.1.2.2.5.1 The DAS shall provide the capability to create a database journal.

DA 3.2.1.2.2.5.2 The DAS shall provide the capability to enable the logging of transactions in a database journal.

DA 3.2.1.2.2.5.3 The DAS shall provide the capability to disable the logging of transactions in a database journal.

DA 3.2.1.2.2.5.4 The DAS shall provide the capability to empty the contents of a database journal.

DA 3.2.1.2.2.5.5

DA 3.2.1.2.2.5.5 The DAS shall provide a rollforward capability to apply journalled transactions to a backup database copy. An error shall be returned if journalling is disabled.

DA 3.2.1.2.2.6 Database Manipulation

DA 3.2.1.2.2.6.1 The DAS shall provide generic views and definitions of the underlying database structure.

DA 3.2.1.2.2.6.2 The DAS shall provide the capability to view data records in the database.

DA 3.2.1.2.2.6.3 The DAS shall provide the capability to print data records in the database.

DA 3.2.1.2.2.6.4 The DAS shall provide the capability to generate reports with data from the database.

DA 3.2.1.2.2.6.5 The DAS shall provide the capability to read data in the databases.

DA 3.2.1.2.2.6.6 The DAS shall provide the capability to modify data in the databases.

DA 3.2.1.2.2.6.7 The DAS shall provide the capability to retrieve data according multiple search criteria.

DA 3.2.1.2.2.6.8 The DAS shall support the capability to create a new view based upon existing tables and views in the database.

DA 3.2.1.2.2.6.9 The DAS shall support the capability to delete a specified view. All views defined in terms of the specified view shall also be deleted.

DA 3.2.1.2.2.7 Database Locking

DA 3.2.1.2.2.7.1 The DAS shall provide the capability to enable/disable database transaction-level locking.

DA 3.2.1.2.2.7.2 The DAS shall provide the capability to enable/disable record, row, and table locking.

DA 3.2.1.2.2.7.3 The DAS shall enable an application to place a read (share) or write (exclusive) lock on all data contained in a table.

DA 3.2.1.2.2.7.4 The DAS shall enable a user-configurable default time-out to be imposed on table locks in order to avoid deadlock.

DA 3.2.1.2.2.7.5 The DAS shall enable an application to unlock a table by means of deleting a read or write lock which was previously placed on the table.

DA 3.2.1.2.2.7.6 The DAS shall enable an application to place a read (share) or write (exclusive) lock on a record or a set of records.

DA 3.2.1.2.2.7.7 The DAS shall enable an application to unlock a record or a set of records by means of deleting a read or write lock which was previously placed on the record(s).

DA 3.2.1.2.2.7.8 The DAS shall enable an application to change the type of lock currently in use on the locked table or records, i.e. from read to write and vice versa.

DA 3.2.1.2.2.7.9 The DAS shall enable an application to request a group of locks where either all locks are obtained successfully or none are obtained. This is an alternative measure for avoiding deadlock.

DA 3.2.1.2.2.7.10 The DAS shall enable an application to delete all locks associated with a specified lock group.

DA 3.2.1.2.3 Distributed Database Services

DA 3.2.1.2.3.1 Database Integrity/Consistency

DA 3.2.1.2.3.1.1 The DAS shall automatically maintain data integrity/consistency among all (replicated or mirrored) copies of the same databases that may exist throughout the network.

DA 3.2.1.2.3.1.2 The DAS shall provide the capability to manually initiate integrity/consistency processing.

DA 3.2.1.2.3.1.3 The DAS shall provide the capability to manually terminate integrity/consistency processing.

DA 3.2.1.2.3.2 Database Updating

DA 3.2.1.2.3.2.1 The DAS shall provide the capability to add data records into a distributed database.

DA 3.2.1.2.3.2.2 The DAS shall provide the capability to update data records in a distributed database.

DA 3.2.1.2.3.2.3 The DAS shall provide the capability to delete data records from a distributed database.

DA 3.2.1.2.3.2.4 The DAS shall provide the capability to recover from database update transactions when replicates are found to be deficient.

DA 3.2.1.2.3.2.5 The DAS shall provide the capability for synchronous distributed database updates via the two-phase commit logic, which guarantees that all database servers participating in a distributed transaction either all commit or all roll back the statements in the transaction.

DA 3.2.1.2.3.2.6 The DAS shall provide a distributed transaction capability so that any transaction can include one or more statements that update data on two or more distinct nodes of a distributed database.

DA 3.2.1.2.3.2.7 The DAS shall provide the capability to create triggers.

DA 3.2.1.2.3.2.8 The DAS shall provide the capability to modify triggers.

DA 3.2.1.2.3.2.9 The DAS shall provide the capability to delete triggers.

DA 3.2.1.2.3.3 Database Servers

DA 3.2.1.2.3.3.1 The DAS shall provide the capability to detect database server failures and direct database queries to alternate servers.

DA 3.2.1.2.3.3.2 The DAS shall provide the capability to store and forward database updates for servers that are not accessible through the network.

DA 3.2.1.2.3.3.3 The DAS shall forward database updates to addressed database servers once connectivity is established.

DA 3.2.1.2.3.3.4 The DAS shall provide the capability to connect to any database server in the network.

DA 3.2.1.2.3.3.5 The DAS shall provide location transparency so that a applications/user/administrator can refer to the same table the same way, regardless of the node to which the applications/user/administrator connects.

DA 3.2.1.2.3.3.6 The DAS shall provide the capability for query, update, and transaction transparency.

DA 3.2.1.2.3.4 Data Exchange Capabilities

DA 3.2.1.2.3.4.1 The DAS shall provide the capability to exchange graphics and text data between nodes.

DA 3.2.1.2.3.4.2 The DAS shall provide the capability to transfer data to multiple destinations.

DA 3.2.1.2.3.4.3 The DAS shall support location transparency of data which allows applications to access data independent of its physical location.

DA 3.2.1.2.3.4.4 The DAS shall provide the capability for distributed database access and information exchange via all available communications media (e.g. network, floppy disks, tapes, etc.)

DA 3.2.1.2.3.4.5 The DAS shall provide the capability to support multiple logical database configurations.

DA 3.2.1.2.3.5 Transaction Processing by Precedence

DA 3.2.1.2.3.5.1 The DAS shall provide the capability to time stamp database records.

DA 3.2.1.2.3.5.2 The DAS shall provide the capability to queue all database transactions by precedence and within precedence by time of receipt.

DA 3.2.1.2.3.5.3 The DAS shall service each database transaction by precedence and within precedence by time of receipt.

DA 3.2.1.2.3.5.4 The DAS shall queue undeliverable database updates by precedence and within precedence by time of receipt.

DA 3.2.1.2.3.5.5 The DAS shall provide the capability to time stamp data fields.

DA 3.2.1.2.3.5.6 The DAS shall provide the capability to store data records by time slice.

DA 3.2.1.2.3.5.7 The DAS shall provide the capability to retrieve historical data from data records stored by time slice.

DA 3.2.1.2.3.5.8 The DAS shall provide the means to assign precedence classes to all information transfers.

DA 3.2.1.2.3.5.9 The DAS shall assign a default precedence (routine) if no precedence is assigned.

DA 3.2.1.2.3.6 Database Replication

DA 3.2.1.2.3.6.1 The DAS shall provide the capability to create replicated databases.

DA 3.2.1.2.3.6.2 The DAS shall provide the capability to update replicated databases.

DA 3.2.1.2.3.6.3 The DAS shall provide the capability to delete updates to an instance to replicated databases.

DA 3.2.1.2.3.6.4 The DAS replication service shall replicate the minimum information necessary to update the database.

DA 3.2.1.2.3.6.5 The DAS shall provide the capability to ensure replicated database updates are applied based on age of data criteria.

DA 3.2.1.2.3.6.6 The DAS shall provide the capability to replicate databases in accordance with the security classification or authorization level of the workstations. (Cross reference with the Security Administration SRS).

DA 3.2.1.2.3.6.7 The DAS shall provide the capability to notify the application when a replicated database update conflict occurs.

DA 3.2.1.2.3.6.8 The DAS shall provide replication services that should support the replication of database objects to include, but not limited to tables, views, triggers, stored procedures and database user accounts and data within those objects.

DA 3.2.1.2.3.6.9 The DAS shall provide conflict resolution services based on a variety of replication processing criteria: time stamp, priority of server, and application defined.

DA 3.2.1.2.3.6.10 The DAS shall provide the capability to replicate transactions for synchronous databases.

DA 3.2.1.2.3.6.11 The DAS shall provide the capability to replicate transactions for asynchronous databases.

DA 3.2.1.2.3.6.12 The DAS shall support a real time forwarded data replication scheme.

DA 3.2.1.2.3.6.13 The DAS shall provide the interfaces and mechanisms necessary to support a batch replication scheme in which an entire database can be copied in bulk across the network to a replicated location at specified intervals.

DA 3.2.1.2.3.6.14 The DAS shall provide the capability to request the forwarding of lost transactions from the originating replicate location.

DA 3.2.1.2.3.6.15 The DAS shall provide the facilities to transparently replicate data among the nodes of the system.

DA 3.2.1.2.3.6.16 The DAS shall provide a DBMS that manages a distributed database so that table replication occurs in such a manner that it is transparent to the application/user/administrator making changes to the replicated tables.

DA 3.2.1.2.3.6.17 The DAS shall determine the capability to define business rules to be used to identify instance of rules to be used in a distributed and replicated database environment.

DA 3.2.1.2.3.6.18 The DAS shall provide the capability to replicate database updates.

DA 3.2.1.2.3.6.19 The DAS shall provide the capability to distribute database updates.

DA 3.2.1.2.3.6.20 The DAS shall provide the capability to replicate only a subset of data in the database or have a different replication scheme for different subsets of data.

DA 3.2.1.2.3.6.21 The DAS shall provide replication capability to support distribution of data in an unstable tactical network. It shall provide data replication mechanisms to measure data concurrency and synchronize databases as required.

DA 3.2.1.2.3.6.22 The DAS shall provide the capability to set the update frequency as well as the replication type for replication processing.

DA 3.2.1.2.3.6.23 The DAS shall provide the capability to use a data-dependent distribution method for distributing database updates. (Distribution is determined by record field values.)

DA 3.2.1.2.3.7 Distributed Database Processing

DA 3.2.1.2.3.7.1 The DAS shall provide the capability to forward all database transactions to any available database server on the network capable of servicing the request.

DA 3.2.1.2.3.7.2 The DAS shall provide the capability to manually override the automatic features.

DA 3.2.1.2.3.7.3 The DAS shall provide the capability to load spatial databases.

DA 3.2.1.2.3.7.4 The DAS shall provide the capability to unload spatial databases.

DA 3.2.1.2.3.7.5 The DAS shall provide the capability to load relational databases.

DA 3.2.1.2.3.7.6

DA 3.2.1.2.3.7.6

DA 3.2.1.2.3.7.6 The DAS internal data distribution interface function shall fully implement open data access standards such as RDA, SQL/CLI, etc.

DA 3.2.1.2.4 Data Dictionary Services

DA 3.2.1.2.4.1 The DAS shall provide the capability to provide database dictionary support (e.g. data definition maintenance).

DA 3.2.1.2.4.2 The DAS shall provide the capability to compare newly-updated database data to application program-supplied old database data in order to identify changes in data fields within the database.

DA 3.2.1.2.4.3 The DAS shall provide the capability to create libraries of data.

DA 3.2.1.2.4.4 The DAS shall provide the capability to modify libraries of data.

DA 3.2.1.2.4.5 The DAS shall provide the capability to delete libraries of databases on defined source access rights.

DA 3.2.1.2.4.6 The DAS shall provide the capability to access libraries of data, based on defined source access rights.

DA 3.2.1.2.4.7 The DAS shall provide the capability to access sequential file data.

DA 3.2.1.2.4.8 The DAS shall provide the capability to access indexed sequential file data.

DA 3.2.1.2.4.9 The DAS shall provide the capability to access direct access file data.

DA 3.2.1.2.4.10 The DAS shall provide data dictionary services through an API, which will provide at a minimum search, display, and update services.

DA 3.2.1.2.4.11 The DAS shall provide the capability to perform searches of the database.

DA 3.2.1.2.4.12 The DAS shall provide the capability to perform data retrievals based on key words.

DA 3.2.1.2.4.13 The DAS shall provide the capability to sort the data based on the contents of any field or set of fields within the database or subset of the database(tables) (i.e. DTG).

DA 3.2.1.2.4.14 The DAS shall provide a data dictionary for all data definitions accessible from any workstation/client application on the network.

DA 3.2.1.2.4.15 The DAS shall provide the capability to merge databases based on the contents of any field or set of fields within the database or subset of the database (tables) (i.e. DTG).

DA 3.2.1.2.4.16 The DAS shall provide naming scheme so that objects throughout a distributed database can be uniquely identified and referenced in applications.

DA 3.2.1.2.4.17 The DAS shall provide the capability to create to the data dictionary.

DA 3.2.1.2.4.18 The DAS shall provide the capability to modify access to the data dictionary.

DA 3.2.1.2.4.19 The DAS shall provide the capability to provide access to the data dictionary.

DA 3.2.2 Data Administration Requirements

DA 3.2.2.1 File Administration Requirements

DA 3.2.2.1.1 The DAS shall provide data administration tools for the maintenance of files. These administration functions are required for the general care and good condition of the system.

DA 3.2.2.1.2 The DAS shall provide the ability to export file(s) over DII COE communication media and optionally notify the client, in accordance with (IAW) client set parameters, on completion of the task.

DA 3.2.2.1.3 The DAS shall provide the ability to import file(s) over DII COE communication media and optionally notify the client, IAW client set parameters, on completion of the task.

DA 3.2.2.1.4 The DAS shall provide the ability to compress, when the client has selected compression, and archive file(s) over DII COE communication media and optionally notify the client, IAW client set parameters, on completion of the task.

DA 3.2.2.1.5 The DAS shall provide the ability to uncompress and restore file(s) over DII COE communication media and optionally notify the client, IAW client set parameters, on completion of the task.

DA 3.2.2.1.6 The DAS shall provide a capability to establish file servers (e.g. DCE file servers).

DA 3.2.2.1.7 The DAS shall provide the capability to enforce the denial or granting of access to any database IAW Access Control Lists.

DA 3.2.2.2 Utilities

DA 3.2.2.2.1 The DAS shall provide utilities to aid in the development and debug of COE and Mission applications and the notification of system administration events.

DA 3.2.2.2.2 The DAS shall provide a capability to dump files. The dumps shall be able to display text and binary files in decimal, octal and hexadecimal format. (Cross reference with Developers Kit).

DA 3.2.2.2.3 The DAS shall provide a capability to print files. The contents of a file shall be able to be spooled to a printer by users, applications, and software/system developers.

DA 3.2.2.3 Database Administration Requirements

There are four primary classifications of capabilities provided by the Database Administration functions:

- Database Administration
- Distributed Database Administration
- Database Administration Utilities
- Database Structure Definition and Manipulation

Database Administration function encapsulates the techniques, methods, tools, and utilities by which the Database Access capabilities are implemented. It is concerned with the actual COTS database implementations. These implementations include Oracle, Sybase, and Informix. The services provided by this subfunction are related to the tasks of installing, monitoring, and maintaining the COTS environment. Where applicable, a common (GUI) and associated API to the COTS/GOTS product administration tools will be used. This will ensure common functions and data necessary to control the database environment will have the same look and feel for the database administrator.

Distributed database administration deals with the initialization, startup, monitoring, and shutdown of the DII COE Data Distribution Capability. The DII COE Data Distribution capability isolates DII COE applications from a set of underlying network database services. These services include distributed database query support, database update replication, and database update notification. In addition, it provides a capability to logically create instances of the distributed database to support simultaneous operation of exercise and operational missions.

The Database Administration Utilities provide the capabilities for archiving, and compressing database files. In addition, it provides capabilities for selectively loading database tables from delimited files.

DA 3.2.2.3.1 Database Administration Services Capabilities

DA 3.2.2.3.1.1 The DAS shall provide the capability to view and edit configuration parameters.

DA 3.2.2.3.1.2 The DAS shall provide the capability to manually override the automatic features.

DA 3.2.2.3.1.3 The DAS shall provide the capability to allocate and manage database disk storage space.

DA 3.2.2.3.1.4 The DAS function shall provide a standard Application Programmers Interface (API) for database administration.

DA 3.2.2.3.1.5 The DAS shall provide a common desktop (GUI) for all COTS/GOTS database administration tools.

DA 3.2.2.3.2 Data Exchange Requirements

DA 3.2.2.3.2.1 The DAS shall provide the capability to specify the format for data exchange between nodes.

DA 3.2.2.3.2.2 The DAS shall provide the capability to specify the format for data exchange between functions.

DA 3.2.2.3.2.3 The DAS shall provide the capability to specify the format for data exchange between users.

DA 3.2.2.3.2.4 The DAS shall provide the capability to specify where and when data is exchanged.

DA 3.2.2.3.3 Backup and Restore Requirements

DA 3.2.2.3.3.1 The DAS shall provide the GUI to backup and restore the database.

DA 3.2.2.3.3.2 The DAS shall provide the capability to direct database auto-updates when databases are being backed up or restored.

DA 3.2.2.3.3.3 The DAS shall provide the capability to activate or deactivate the database management system itself.

DA 3.2.2.3.3.4 The DAS shall provide the capabilities for recovery of a corrupted database.

DA 3.2.2.3.3.5 The DAS shall provide services which support various types of backups, such as full backups, incremental since last backup, and incremental since a specified last modification date.

DA 3.2.2.3.3.6 The DAS shall enable read and write accesses to continue while backups are being performed.

DA 3.2.2.3.3.7 The DAS shall permit a node to automatically restore its database from another node.

DA 3.2.2.3.3.8 The DAS shall, during a restore, allow read and write access to areas not being restored.

DA 3.2.2.3.4 Audit Trail Requirements

DA 3.2.2.3.4.1 The DAS shall provide the capability to view database audit trails.

DA 3.2.2.3.4.2 The DAS shall provide the capability to audit database operations to include the following: database connects, database disconnects, data definition language (DDL) statements, and data manipulation language (DML) statements.

DA 3.2.2.3.4.3 The DAS shall provide the capability to activate database auditing.

DA 3.2.2.3.4.4 The DAS shall provide the capability to deactivate database auditing.

DA 3.2.2.3.4.5 The DAS shall provide the capability to configure the types of operations to be captured in the audit trail.

DA 3.2.2.3.4.6 The DAS shall produce an audit record containing information regarding the user performing the operation, type of operation, object involved in the operation, and date and time of the operation.

DA 3.2.2.3.4.7 The DAS shall provide the capability to selectively archive the database audit trail by criteria such as: user who performed the operation, type of operation, object acted on, or data and time of operation.

DA 3.2.2.3.4.8 The DAS shall provide the capability to selectively purge the database audit trail by criteria such as: user who performed the operation, type of operation, object acted on, or data and time of operation.

DA 3.2.2.3.5 Database Access and Security Requirements

All requirements in this section should be cross referenced with the Security Administration SRS. Only authorized administrators / users should be allowed to establish and maintain security (grant permissions).

DA 3.2.2.3.5.1 The DAS shall provide the capability to monitor user access to the database.

DA 3.2.2.3.5.2 The DAS shall provide the capability to establish and maintain database security (grant permissions). This security access includes the creation, deletion, and modification of database access permissions by user, workstation, or user functional role. Access privileges will include table, view, row and field level access.

DA 3.2.2.3.5.3 The DAS shall provide the capability to retrieve databases selected by an application program from a remote site workstation provided the requester has access to that database and the workstation to which the data is returned has the same or higher security level authorization.

DA 3.2.2.3.5.4 The DAS shall provide the capability for the monitoring of optional security relevant events, such as: attempts to change discretionary access controls, and attempts to create, copy, sanitize, purge, or execute databases.

DA 3.2.2.3.5.5 The DAS shall provide the capability for the monitoring of optional security relevant events to be suspended.

DA 3.2.2.3.6 Discretionary Access Control (DAC)

All requirements in this section should be cross referenced with the Security SRS.

DA 3.2.2.3.6.1 The DAS shall provide the capability to enforce data access controls based on the discretionary access control requirements.

DA 3.2.2.3.6.2 The DAS shall provide the capability to restrict access to files based on the user's identity and on access modes (e.g. read, write, execute).

DA 3.2.2.3.6.3 The DAS shall define and control access between named users and names objects (e.g., files and programs).

DA 3.2.2.3.6.4 The DAS shall allow users to specify and control sharing of objects by named individuals or defined groups of individuals, or by both.

DA 3.2.2.3.6.5 The DAS shall, either by explicit user action or by default, protect objects from unauthorized access.

DA 3.2.2.3.6.6 The DAS shall be capable of including or excluding access to each object on a per user and on a per group basis.

DA 3.2.2.3.6.7 The DAS shall ensure that access permission to an object by users not already possessing access permission shall only be assigned by authorized users (e.g. system administrators).

DA 3.2.2.3.6.8 The DAS shall permit a user to grant or revoke access to an object only if the user has control permission to that object.

DA 3.2.2.3.6.9 The DAS shall be used within the COE to maintain logical separation among users, based on need to know.

DA 3.2.2.3.7 Mandatory Access Control (MAC)

DA 3.2.2.3.7.1 The DAS shall only permit access to classified information to authorized users with a clearance level equal to or higher than the information's assigned classification.

DA 3.2.2.3.7.2 The DAS shall ensure that subjects and objects shall be assigned sensitivity labels that are a combination of classification levels and categories, and the labels shall be used as the basis for mandatory access control decisions.

DA 3.2.2.3.7.3 The DAS shall support two or more such security levels.

DA 3.2.2.3.7.4 The following requirements shall hold for all accesses between subjects external to the DAS and all objects directly or indirectly accessible by these subjects:

DA 3.2.2.3.7.4.1 A subject can read an object only if the classification in the subject's security level is greater than or equal to the classification in the object's security level and the categories in the subject's security level include all the categories in the object's security level.

DA 3.2.2.3.7.4.2 A subject can write an object only if the classification in the subject's security level is less than or equal to the classification in the object's security level and all the categories in the subject's security level are included in the categories of the object's security level.

DA 3.2.2.3.8 Sensitivity Labels

DA 3.2.2.3.8.1 The DAS shall use sensitivity labels as the basis for mandatory access control decisions.

DA 3.2.2.3.8.2 The DAS sensitivity labels shall accurately represent security levels of the specific subjects or objects with which they are associated.

DA 3.2.2.3.8.3 The DAS shall ensure that when data is exported the sensitivity labels shall accurately and unambiguously represent the internal labels and shall be associated with the information being exported.

DA 3.2.2.4 Distributed Database Administration

DA 3.2.2.4.1 Distributed Database Capabilities

DA 3.2.2.4.1.1 The DAS shall support the ability to determine which logically separate databases exist.

DA 3.2.2.4.1.2 The DAS shall provide the capability to create replicated databases.

DA 3.2.2.4.1.3 The DAS shall provide the capability to load replicated databases.

DA 3.2.2.4.1.4 The DAS shall provide the capability to store replicated databases.

DA 3.2.2.4.1.5 The DAS shall provide the capability to update replicated databases.

DA 3.2.2.4.1.6 The DAS shall provide the capability to activate replicated databases.

DA 3.2.2.4.1.7 The DAS shall provide the capability to delete replicated databases.

DA 3.2.2.4.1.8 The DAS shall provide the capability to create databases.

DA 3.2.2.4.1.9 The DAS shall provide the capability to open a database.

DA 3.2.2.4.1.10 The DAS shall provide the capability to close a database.

DA 3.2.2.4.1.11 The DAS shall provide the capability to delete databases.

DA 3.2.2.4.1.12 The DAS shall provide the capability to purge databases.

DA 3.2.2.4.1.13 The DAS shall provide the capability to unload relational databases.

DA 3.2.2.4.1.14 The DAS shall provide the capability to load spatial databases.

DA 3.2.2.4.1.15 The DAS shall provide the capability to unload spatial databases.

DA 3.2.2.4.1.16 The DAS shall provide the capability to delete selected database(s) at the request of an application program.

DA 3.2.2.4.1.17 The DAS shall provide the capability to delete all databases at the request of an application program.

DA 3.2.2.4.1.18 The DAS shall at the clients request, display data elements used across databases.

DA 3.2.2.4.1.19 The DAS shall provide the capability to create distributed database configuration information.

DA 3.2.2.4.1.20 The DAS shall provide the capability to maintain distributed database configuration information.

DA 3.2.2.4.1.21 The DAS shall provide the capability to distribute the distributed database configuration information.

DA 3.2.2.4.2 Database Replication

DA 3.2.2.4.2.1 The DAS shall provide the capability to define dynamically the database replication scheme.

DA 3.2.2.4.2.2 The DAS shall provide the capability to dynamically activate the database replication scheme.

DA 3.2.2.4.2.3 The DAS shall provide the capability to dynamically deactivate the database replication scheme.

DA 3.2.2.4.2.4 The DAS shall provide the capability to define dynamically the database proponent scheme.

DA 3.2.2.4.2.5

DA 3.2.2.4.2.5 The DAS shall provide the capability to create mirrored databases of selected operational databases.

DA 3.2.2.4.2.6 The DAS shall provide the capability to store mirrored databases of selected operational databases.

DA 3.2.2.4.2.7 The DAS shall provide the capability to update mirrored databases of selected operational databases.

DA 3.2.2.4.2.8 The DAS shall provide the capability to activate mirrored databases of selected operational databases.

DA 3.2.2.4.2.9 The DAS shall provide the capability to access mirrored databases of selected operational databases.

DA 3.2.2.4.2.10 The DAS shall provide the administration tools that need to be developed to support the monitoring of replication status.

DA 3.2.2.4.2.11 The DAS shall enable/disable database mirroring (to provide non-stop recovery in the event of media failure).

DA 3.2.2.4.2.12 The DAS shall provide the capability to dynamically modify the update frequency of replicated databases.

DA 3.2.2.4.2.13 The DAS shall provide the capability to store multiple replication schemes.

DA 3.2.2.4.2.14 The DAS shall provide the capability to manually synchronize replicated databases.

DA 3.2.2.4.2.15 The DAS shall provide notification when the database update delivery time for a database server exceeds a user specified time.

DA 3.2.2.4.3 Distributed Database Updating

DA 3.2.2.4.3.1 The DAS shall provide the capability to determine which databases accept database auto-update messages.

DA 3.2.2.4.3.2 The DAS shall set the precedence of queues for undeliverable database updates.

DA 3.2.2.4.3.3 The DAS shall provide the capability to archive database update queues.

DA 3.2.2.4.4 Distributed Database Servers

DA 3.2.2.4.4.1 The DAS shall provide the capability to create and maintain database servers.

DA 3.2.2.4.4.2 The DAS shall direct what database updates are forwarded to addressed database servers once connectivity is established.

DA 3.2.2.4.4.3 The DAS shall provide the capability to initialize a database server.

DA 3.2.2.4.4.4 The DAS shall provide the capability to control any data distribution server, (given appropriate access control mechanisms that will ensure that a database administrator at one site cannot easily alter the configuration of another site's database).

DA 3.2.2.4.4.5 The DAS shall provide the capability to shut down a database server.

DA 3.2.2.5 Database Administration Utilities

DA 3.2.2.5.1 Database Load Utilities

DA 3.2.2.5.1.1 The DAS shall provide the capability to load database files.

DA 3.2.2.5.1.2 The DAS shall provide the capability to unload database files.

DA 3.2.2.5.1.3 The DAS shall provide the capability to bulk load data into the database tables.

DA 3.2.2.5.1.4 The DAS shall provide the capability to selectively populate the database including updates and reloads.

DA 3.2.2.5.2 Database Integrity/Consistency Utilities

DA 3.2.2.5.2.1 The DAS shall incorporate utilities to maintain data integrity/consistency among all copies of the same databases that may exist throughout the network.

DA 3.2.2.5.2.2 The DAS shall incorporate utilities to provide the capability to manually initiate integrity/consistency processing.

DA 3.2.2.5.2.3 The DAS shall incorporate utilities to provide the capability to manually terminate integrity/consistency processing.

DA 3.2.2.5.3 Data Manipulation and Maintenance Utilities

DA 3.2.2.5.3.1 The DAS shall provide the capability to automatically archive some or all of the data captured and processed within the database(s) as specified by the administrator.

DA 3.2.2.5.3.2

DA 3.2.2.5.3.2 The DAS shall provide industry standard data compression capabilities. This includes compression utilities such as pkzip, gzip, pkarc, etc.

DA 3.2.2.5.3.3 The DAS shall provide the capability to convert data between versions of the database.

DA 3.2.2.5.4 Database Administration Configuration Utilities

DA 3.2.2.5.4.1 The DAS shall provide the capability to configure reusable system or database utilities, (that is to provide the capability to generate or configure a site, or its application code, or its database-specific utilities and tailoring them to the site's specific needs).

DA 3.2.2.6 Database Structure Definition and Manipulation

DA 3.2.2.6.1 Database Structure Requirements

DA 3.2.2.6.1.1 The DAS shall support mechanisms that provide data pertaining to the database configuration and structure.

DA 3.2.2.6.2 Database Table Requirements

DA 3.2.2.6.2.1 The DAS shall provide the capability to create tables in the current database.

DA 3.2.2.6.2.2 The DAS shall provide the capability to modify tables in the current database.

DA 3.2.2.6.2.3 The DAS shall provide the capability to delete tables in the current database.

DA 3.2.2.6.2.4 The DAS shall support operations to get data pertaining to the database configuration and structure, i.e., the size of a database, the list of tables in the database, the location of the database, the journalling and optional security monitoring status, etc.

DA 3.2.2.6.3 Database Column Requirements

DA 3.2.2.6.3.1 The DAS shall provide the capability to specify columns to be added, modified, and/or deleted within databases.

DA 3.2.2.6.4 Database Attribute Requirements

DA 3.2.2.6.4.1 The DAS shall provide the capability to specify attributes to be added, modified, and/or deleted within databases.

DA 3.2.2.6.4.2 The DAS provides the capability to identify the attributes and attribute characteristics which make up tables within database.

DA 3.2.2.6.4.3 The DAS shall support the establishment, management, and administration of replication domains defined at the data element (attribute or field) level.

DA 3.2.2.6.5 Performance Requirements

DA 3.2.2.6.5.1 The DAS shall provide the capability to backup a database of up to 5 MB to local, non-volatile storage within five minutes on a workstation with active remote sessions.

DA 3.2.2.6.5.2 The DAS shall provide the capability to restore a database of up to 5 MB from local, non-volatile storage within five minutes on a workstation with active remote sessions.

DA 3.2.2.6.5.3 The DAS shall provide tools to enable a database administrator to monitor the performance.

DA 3.3 DATA ACCESS SERVICES EXTERNAL INTERFACE REQUIREMENTS

The DAS function shall provide standard APIs as specified in *Appendix A.*

DA 3.4 DATA ACCESS SERVICES INTERNAL INTERFACE REQUIREMENTS

The DAS function shall provide standard APIs as specified in *Appendix B.*

DA 3.5 DATA ACCESS SERVICES INTERNAL DATA REQUIREMENTS

DA 3.5.1 The DAS shall internally interface (transparent to the operator) with the existing data elements of the DBIF, DAC, and COTS RDBMS products.

DA 3.6 ADAPTATION REQUIREMENTS

DA 3.6.1 The operational parameters required for the operations of the DAS are dependent on the COTS RDBMS.

DA 3.7 SAFETY REQUIREMENTS

Safety is the responsibility of the overall system into which the DAS software is embedded. DAS software shall not interfere with, nor defeat the purpose of, safety functions implemented in the host system.

DA 3.8 SECURITY AND PRIVACY REQUIREMENTS

DA 3.8.1 The DAS shall ensure that the security mechanisms in the COE are used by the database.

DA 3.8.2 The DAS shall use the audit mechanisms associated with the COE security services.

DA 3.8.3 The DAS shall not conflict with the security mechanisms in the COE.

DA 3.9 DATA ACCESS SERVICES ENVIRONMENT REQUIREMENTS

DA 3.9.1 The DAS software shall be portable and required to execute on the following platforms: The HP/UX 9.0; 10.0,The SUN SPARC Solaris 2.4/ 2.5, Win NT 4.0, and Win NT 5.0.

DA 3.10 COMPUTER RESOURCE REQUIREMENTS

TBD.

DA 3.11 SOFTWARE QUALITY FACTORS

TBD.

DA 3.12 DESIGN AND IMPLEMENTATION CONSTRAINTS

Access Control DAS tools:

Databases	Operating Systems
Informix 7.12	Sun Solaris 2.4, & 2.5.1, HP-UX 9.0.7 & 10.10
Oracle 7.2.2.4	Sun Solaris 2.4, HP-UX 9.0.7
Oracle 7.3	Sun Solaris 2.5.1, HP-UX 10.10
Sybase 10.0.2a	Sun Solaris 2.4, HP-UX 9.0.7
Sybase 11.0	Sun Solaris 2.5.1, HP-UX 10.10
JCALS SWP 1.0	Sun Solaris 2.4, HP-UX 9.0.7

The File Access function shall work with the following operating system versions: HP/UX9.0.7, HP-UX 10.10, Sun Solaris 2.4 and Solaris 2.5..

- The File Access function shall be implemented using approved system APIs to support integration with the DII COE.
- The File Access function shall be implemented using approved system standards to support integration with the DII COE.

DA 3.13 PERSONNEL-RELATED REQUIREMENTS

Not applicable. Personnel requirements shall be determined by the developers of the system in which the DAS module is embedded.

DA 3.14 TRAINING-RELATED REQUIREMENTS

Not applicable. Training requirements shall be determined by the developers of the system in which the DAS module is embedded.

DA 3.15 LOGISTICS-RELATED REQUIREMENTS

The DAS developer is responsible for software maintenance, software support, and software updates. The DISA Configuration Manager (CM) is responsible for distribution of the DAS product to system developers.

DA 3.16 OTHER REQUIREMENTS

None.

DA 3.17 PACKAGING REQUIREMENTS

The DAS software shall be delivered in accordance with DII COE guidelines.

DA 3.18 PRECEDENCE AND CRITICALITY OF REQUIREMENTS

The following table depicts the mapping of the requirements in Section 3 to their corresponding precedence and criticality code and to other related requirements within the DAS SRS. The precedence and criticality codes are the following:

- 1 for Essential (E)
- 2 for Desirable (D)
- 3 for Optional (O).

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.	**DATA ACCESS SERVICES CAPABILITY REQUIREMENTS**		
DA 3.2.1.	**Data Management Requirements**		
DA 3.2.1.1.	**File Access Requirements**		
DA 3.2.1.1.1.	**Cross Platform Portability**		
DA 3.2.1.1.1.1.	The DAS shall be able to work with files which range in size from 0 bytes to the largest file size supported across all DII COE approved platforms. Four gigabytes is the largest file size portable across all DII COE approved platforms.	1	3.2.1.1.1.2
DA 3.2.1.1.1.2.	The DAS shall support 32 bit file access formats. The 32 bit file format is standard across all DII COE approved platforms.	1	
DA 3.2.1.1.1.3.	The DAS shall be able to read and write variable size file blocks. The default block size varies from operating system to operating system. The DAS shall allow parameters to define the block size.	1	
DA 3.2.1.1.1.4.	The DAS shall provide a cross-platform file structure which will allow machines of different architectures and capabilities to determine the file's characteristics. Table 3.2.1.1.1-1 summarizes each of the attributes contained within the cross-platform file structure.	2	
DA 3.2.1.1.1.5.	The DAS shall support big-endian (byte 0 is the most significant) and little-endian (byte 0 is the least significant) byte swapping. Various machines have different	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	architectures which store data differently. The File Management Services shall provide the ability to specify a parameter which will order the Most Significant Bit(MSB) .		
DA 3.2.1.1.1.6.	The DAS shall provide support for maintaining alphanumeric case sensitivity of file name. The POSIX Operating System maintains case sensitivity.	1	
DA 3.2.1.1.2.	**Functional Capabilities**		
DA 3.2.1.1.2.1.	The DAS shall support the subset of file management functions which exist across the DII COE approved system standards and platforms. These functions shall work with both local and remote files. Table 3.2.1.1.2-1 lists functions cross referenced against POSIX and Windows Operating Systems.	2	
DA 3.2.1.1.2.2.	The DAS shall provide a capability to simultaneously access files in read-only mode.	1	
DA 3.2.1.1.2.3.	The DAS shall provide the capability to create and access files with read, write and execute parameter associations.	1	
DA 3.2.1.1.2.4.	The DAS shall provide auditing mechanisms for tracking the time and identity of the user or application which is accessing a file. This data will be written to the DII COE audit file. This capability should be able to be enabled or disabled utilizing security administration tools. (Cross reference with the Security Administration SRS).	2	
DA 3.2.1.1.3.	**File System Formats**		
DA 3.2.1.1.3.1.	The DAS shall have the capability to read and write text files.	1	
DA 3.2.1.1.3.2.	The DAS shall have the capability to use binary files. A binary file is one that is in a specific application format or is directly machine readable. They typically cannot be directly read by humans. There are some specific forms of binary file which are	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	pertinent to DII COE. These binary file types are: Compressed files, Encrypted Files, and Library Files.		
DA 3.2.1.1.3.3.	The DAS shall have the capability to compress files using DII COE-approved compression algorithms. Compressed files are used to save space when not in use or to reduce file size for file transfer and storage. The DAS shall uncompress a file prior to the retrieval of data.	2	
DA 3.2.1.1.3.4.	The DAS shall have the capability to encrypt files using the DES encryption or other specified algorithm. Encrypted files are files which have been encoded with a security key to prevent unwarranted access to the contents of the file. (Cross reference with the Security Administration SRS).	2	
DA 3.2.1.1.3.5.	The DAS shall have the capability to create and utilize library files. Libraries provide an efficient method for storing and maintaining different types and amounts of data.	3	
DA 3.2.1.1.4.	**File Feature Specification**		
DA 3.2.1.1.4.1.	The DAS shall support standard file feature specifications. These specifications listed in Table 3.2.1.1.4-1 provide an easy cross reference for determining common file formats.	2	
DA 3.2.1.1.4.2.	The DAS shall provide support for using valid characters and separators for file names. Table 3.2.1.1.4-2 depicts each file feature and the valid values.	2	
DA 3.2.1.1.5.	**Directory Services**		
DA 3.2.1.1.5.1.	The DAS shall provide the capability to get directory information.	1	
DA 3.2.1.1.5.2.	The DAS shall provide support for hidden files.	2	3.2.1.1.5.1
DA 3.2.1.1.5.3.	The DAS shall provide the capability to get the current directory.	1	3.2.1.1.5.3
DA 3.2.1.1.5.4.	The DAS shall provide the capability to traverse the directory tree.	1	3.2.1.1.5.1
DA 3.2.1.1.5.5.	The DAS shall provide the capability to get	1	3.2.1.1.1.7

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	a list of files in a directory.		
DA 3.2.1.1.5.6.	The DAS shall provide the capability to access data files identified by logical, not physical, file names.	1	
DA 3.2.1.1.5.7.	The DAS shall provide the capability to access local and remote data files.	1	
DA 3.2.1.2.	**Database Access Requirements**		
DA 3.2.1.2.1.	**Database Management Services Capabilities**		
DA 3.2.1.2.1.1.	The DAS shall process ANSI standard SQL as specified in FIPS PUB 127-2.	1	
DA 3.2.1.2.1.2.	The DAS shall support processing of SQL statements embedded in an application program.	1	
DA 3.2.1.2.1.3.	The DAS shall provide the capability to create named sequences of SQL statements at the request of an application program.	1	
DA 3.2.1.2.1.4.	The DAS shall provide the capability to modify named sequences of SQL statements at the request of an application program.	1	
DA 3.2.1.2.1.5.	The DAS shall provide the capability to save named sequences of SQL statements at the request of an application program.	1	
DA 3.2.1.2.1.6.	The DAS shall provide the capability to execute named sequences of SQL statements at the request of an application program.	1	3.2.1.2.1.3
DA 3.2.1.2.1.7.	The DAS shall provide the capability to delete named sequences of SQL statements at the request of an application program.	1	
DA 3.2.1.2.1.8.	The DAS shall provide the capability to commit database transactions.	1	
DA 3.2.1.2.1.9.	The DAS shall enable mission applications, as well as other COE components, to use stored procedures.		
DA 3.2.1.2.1.10.	The DAS shall support the notification of applications when a database transaction cannot be performed	1	
DA 3.2.1.2.1.11.	The DAS shall provide the capability to rollback database transactions.	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.1.2.1.12.	The DAS shall provide capabilities which monitor for the occurrence of conditions established by the application. These capabilities shall also include the ability to notify the appropriate application processes when these conditions are satisfied.	2	
DA 3.2.1.2.1.13.	The DAS shall provide the capability to create and add configuration information utilizing identifiers such as Configuration ID, Configuration Entry ID to identity the configuration data itself as well as the configuration entry data.	2	
DA 3.2.1.2.1.14.	The DAS shall provide the capability to save the configuration entry information.	2	3.2.1.2.1.15
DA 3.2.1.2.1.15.	The DAS shall provide the capability to delete after confirmation, the configuration entry as specified by a unique configuration entry identifier.	2	
DA 3.2.1.2.1.16.	The DAS shall provide the capability to maintain mapping between logical database identifiers and physical locations to provide local transparency.	1	
DA 3.2.1.2.1.17.	The DAS shall provide the capability to use multiple local and remote databases concurrently.	1	
DA 3.2.1.2.1.18.	The DAS shall provide the capability to create multiple configurations of logical databases.	1	
DA 3.2.1.2.1.19.	The DAS shall provide the capability to modify multiple configurations of logical databases.	1	
DA 3.2.1.2.1.20.	The DAS shall provide the capability to delete multiple configurations of logical databases.	1	
DA 3.2.1.2.1.21.	The DAS shall provide the capability to add or delete databases on different hosts (nodes on the network) dynamically.	2	
DA 3.2.1.2.1.22.	The DAS shall provide a common Graphical User Interface (GUI) for all DAS tools.	2	
DA 3.2.1.2.1.23.	The DAS shall provide the capability for	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	asynchronous operations so that client request are queued and sent when the connection is available and responses are also queued.		
DA 3.2.1.2.1.24.	The DAS shall provide the capability for suspended / disconnected client operations. ****Examples to be added. ****	2	
DA 3.2.1.2.1.25.	The DAS shall provide the capability for unsolicited data alerts which provides for incoming request to become available when received.	2	
DA 3.2.1.2.1.26.	The DAS shall provide the capability for "auto-configuration" which provides an uniform registration system for application agents and client. ****Sample attributes to be added.****	2	
DA 3.2.1.2.1.27.	The DAS shall provide the capability to work with different RAID modes.		
DA 3.2.1.2.1.28.	The DAS shall provide the capability to load multimedia.	2	
DA 3.2.1.2.1.29.	The DAS shall provide the capability to store multimedia.	2	
DA 3.2.1.2.1.30.	The DAS shall provide the capability to query multimedia.	2	
DA 3.2.1.2.1.31.	The DAS shall provide the capability to delete multimedia.	2	
DA 3.2.1.2.1.32.	The DAS shall provide the capability to update multimedia.	2	
DA 3.2.1.2.1.33.	The DAS shall provide the capability to load full motion.	2	
DA 3.2.1.2.1.34.	The DAS shall provide the capability to store full motion.	2	
DA 3.2.1.2.1.35.	The DAS shall provide the capability to query full motion.	2	
DA 3.2.1.2.1.36.	The DAS shall provide the capability to delete full motion.	2	
DA 3.2.1.2.1.37.	The DAS shall provide the capability to update full motion.	2	
DA 3.2.1.2.1.38.	The DAS shall provide the capability to load full screen video.	2	
DA 3.2.1.2.1.39.	The DAS shall provide the capability to	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	store full screen video.		
DA 3.2.1.2.1.40.	The DAS shall provide the capability to query full screen video.	2	
DA 3.2.1.2.1.41.	The DAS shall provide the capability to delete full screen video.	2	
DA 3.2.1.2.1.42.	The DAS shall provide the capability to update full screen video.	2	
DA 3.2.1.2.1.43.	The DAS shall provide the capability to load high fidelity audio.	2	
DA 3.2.1.2.1.44.	The DAS shall provide the capability to store high fidelity audio.	2	
DA 3.2.1.2.1.45.	The DAS shall provide the capability to query high fidelity audio.	2	
DA 3.2.1.2.1.46.	The DAS shall provide the capability to delete high fidelity audio.	2	
DA 3.2.1.2.1.47.	The DAS shall provide the capability to update high fidelity audio.	2	
DA 3.2.1.2.1.48.	The DAS shall provide Ada interfaces for all public APIs.	1	
DA 3.2.1.2.1.49.	The DAS shall provide the capability to issue SQL statements through API function calls.	1	
DA 3.2.1.2.1.50.	The DAS shall provide data access to heterogeneous databases in accordance with Remote Data Access (RDA) Standards.	1	
DA 3.2.1.2.2.	**Application Generation**		
DA 3.2.1.2.2.1.	**Application Generation Capabilities**		
DA 3.2.1.2.2.1.1.	The DAS shall provide the capability to create data entry forms using a standard forms generation language.	2	
DA 3.2.1.2.2.1.2.	The DAS shall provide the capability to modify data entry forms using a standard forms generation language.	2	
DA 3.2.1.2.2.1.3.	The DAS shall provide the capability to delete data entry forms using a standard forms generation language.	2	
DA 3.2.1.2.2.1.4.	The DAS shall provide the capability to create reports using a standard report specification language.	2	
DA 3.2.1.2.2.1.5.	The DAS shall provide the capability to	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	modify reports using a standard report specification language.		
DA 3.2.1.2.2.1.6.	The DAS shall provide the capability to delete reports using a standard report specification language.	2	
DA 3.2.1.2.2.1.7.	The DAS shall provide the capability to embed API function calls in forms and report generation language specifications.	1	
DA 3.2.1.2.2.1.8.	The DAS shall provide the capability to integrate database objects including (but not limited to) maps, overlays, documents, reports, messages, and images.	3	
DA 3.2.1.2.2.	**Database Query Processing**		
DA 3.2.1.2.2.1.	The DAS shall provide the capability to query for data records in the database.	1	
DA 3.2.1.2.2.2.	The DAS shall provide the capability to create queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.	2	
DA 3.2.1.2.2.3.	The DAS shall provide the capability to modify queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.	2	
DA 3.2.1.2.2.4.	The DAS shall provide the capability to store queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.	2	
DA 3.2.1.2.2.5.	The DAS shall provide the capability to delete queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.	2	
DA 3.2.1.2.2.6.	The DAS shall provide the capability to recall queries on an ad hoc basis in order to produce special reports that are not previously formatted and available through the database applications themselves.	2	
DA 3.2.1.2.2.7.	The DAS shall provide the capability to	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	store the results of an ad hoc query as a system file.		
DA 3.2.1.2.2.2.8.	The DAS shall provide the capability to execute ad hoc (e.g. relational, spatial, combined) database queries.	1	
DA 3.2.1.2.2.2.9.	The DAS shall provide the capability for multiple local and remote application programs to concurrently query a database instance.	1	
DA 3.2.1.2.2.2.10.	The DAS shall provide the capability for application programs to query multiple local and remote databases concurrently.	1	
DA 3.2.1.2.2.3.	**Database Backup and Restore Processing**		
DA 3.2.1.2.2.3.1.	The DAS shall be able to compress all the data offloaded at the user's discretion and automatically decompress all the restored data when the DAS detects that the user is attempting to restore compressed data.	3	
DA 3.2.1.2.2.3.2.	The DAS shall archive data at the user's discretion and restore the data when directed.	1	
DA 3.2.1.2.2.3.3.	The DAS shall provide to the application on request an audit report containing all records that were rejected during the offload or during the load. The report shall indicate the reason each record was rejected.	2	
DA 3.2.1.2.2.4.	**Performance Optimization**		
DA 3.2.1.2.2.4.1.	The DAS shall provide the capability to optimize data traffic to improve communication performance.	2	
DA 3.2.1.2.2.4.2.	The DAS shall provide the capability to reduce the size of data messages.	2	
DA 3.2.1.2.2.4.3.	The DAS shall provide the capability to optimize data queues.	2	
DA 3.2.1.2.2.4.4.	The DAS shall provide the capability to optimize SQL statements.	2	
DA 3.2.1.2.2.5.	**Database Journal Processing**		
DA 3.2.1.2.2.5.1.	The DAS shall provide the capability to create a database journal.	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.1.2.2.5.2.	The DAS shall provide the capability to enable the logging of transactions in a database journal.	1	
DA 3.2.1.2.2.5.3.	The DAS shall provide the capability to disable the logging of transactions in a database journal.	1	
DA 3.2.1.2.2.5.4.	The DAS shall provide the capability to empty the contents of a database journal.	1	
DA 3.2.1.2.2.5.5.	The DAS shall provide a rollforward capability to apply journalled transactions to a backup database copy. An error shall be returned if journalling is disabled.	1	
DA 3.2.1.2.2.6.	**Database Manipulation**		
DA 3.2.1.2.2.6.1.	The DAS shall provide generic views and definitions of the underlying database structure.	1	
DA 3.2.1.2.2.6.2.	The DAS shall provide the capability to view data records in the database.	1	
DA 3.2.1.2.2.6.3.	The DAS shall provide the capability to print data records in the database.	1	
DA 3.2.1.2.2.6.4.	The DAS shall provide the capability to generate reports with data from the database.	1	
DA 3.2.1.2.2.6.5.	The DAS shall provide the capability to read data in the databases.	1	
DA 3.2.1.2.2.6.6.	The DAS shall provide the capability to modify data in the databases.	1	
DA 3.2.1.2.2.6.7.	The DAS shall provide the capability to retrieve data according multiple search criteria.	1	
DA 3.2.1.2.2.6.8.	The DAS shall support the capability to create a new view based upon existing tables and views in the database.	1	
DA 3.2.1.2.2.6.9.	The DAS shall support the capability to delete a specified view. All views defined in terms of the specified view shall also be deleted.	1	
DA 3.2.1.2.2.7.	**Database Locking**		
DA 3.2.1.2.2.7.1.	The DAS shall provide the capability to enable/disable database transaction-level locking.	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.1.2.2.7.2.	The DAS shall provide the capability to enable/disable record, row, and table locking.	1	
DA 3.2.1.2.2.7.3.	The DAS shall enable an application to place a read (share) or write (exclusive) lock on all data contained in a table.	1	
DA 3.2.1.2.2.7.4.	The DAS shall enable a user-configurable default time-out to be imposed on table locks in order to avoid deadlock.	1	
DA 3.2.1.2.2.7.5.	The DAS shall enable an application to unlock a table by means of deleting a read or write lock which was previously placed on the table.	1	
DA 3.2.1.2.2.7.6.	The DAS shall enable an application to place a read (share) or write (exclusive) lock on a record or a set of records.	1	
DA 3.2.1.2.2.7.7.	The DAS shall enable an application to unlock a record or a set of records by means of deleting a read or write lock which was previously placed on the record(s).	1	
DA 3.2.1.2.2.7.8.	The DAS shall enable an application to change the type of lock currently in use on the locked table or records, i.e. from read to write and vice versa.	2	
DA 3.2.1.2.2.7.9.	The DAS shall enable an application to request a group of locks where either all locks are obtained successfully or none are obtained. This is an alternative measure for avoiding deadlock.	1	
DA 3.2.1.2.2.7.10.	The DAS shall enable an application to delete all locks associated with a specified lock group.	1	
DA 3.2.1.2.3.	**Distributed Database Services**		
DA 3.2.1.2.3.1.	**Database Integrity/Consistency**		
DA 3.2.1.2.3.1.1.	The DAS shall automatically maintain data integrity/consistency among all (replicated or mirrored) copies of the same databases that may exist throughout the network.	1	
DA 3.2.1.2.3.1.2.	The DAS shall provide the capability to manually initiate integrity/consistency	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	processing.		
DA 3.2.1.2.3.1.3.	The DAS shall provide the capability to manually terminate integrity/consistency processing.	1	
DA 3.2.1.2.3.2.	**Database Updating**		
DA 3.2.1.2.3.2.1.	The DAS shall provide the capability to add data records into a distributed database.	1	
DA 3.2.1.2.3.2.2.	The DAS shall provide the capability to update data records in a distributed database.	1	
DA 3.2.1.2.3.2.3.	The DAS shall provide the capability to delete data records from a distributed database.	1	
DA 3.2.1.2.3.2.4.	The DAS shall provide the capability to recover from database update transactions when replicates are found to be deficient.	2	
DA 3.2.1.2.3.2.5.	The DAS shall provide the capability for synchronous distributed database updates via the two-phase commit logic, which guarantees that all servers participating in a distributed transaction either all commit or all roll back the statements in the transaction.	1	
DA 3.2.1.2.3.2.6.	The DAS shall provide a distributed transaction capability so that any transaction can include one or more statements that update data on two or more distinct nodes of a distributed database.	1	
DA 3.2.1.2.3.2.7.	The DAS shall provide the capability to create triggers.	1	
DA 3.2.1.2.3.2.8.	The DAS shall provide the capability to modify triggers.	1	
DA 3.2.1.2.3.2.9.	The DAS shall provide the capability to delete triggers.	1	
DA 3.2.1.2.3.3.	**Database Servers**		
DA 3.2.1.2.3.3.1.	The DAS shall provide the capability to detect database server failures and direct database queries to alternate servers.	2	
DA 3.2.1.2.3.3.2.	The DAS shall provide the capability to store and forward database updates for servers that are not accessible through the	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	network.		
DA 3.2.1.2.3.3.3.	The DAS shall forward database updates to addressed database servers once connectivity is established.	2	
DA 3.2.1.2.3.3.4.	The DAS shall provide the capability to connect to any database server in the network.	1	
DA 3.2.1.2.3.3.5.	The DAS shall provide location transparency so that an applications/user/administrator can refer to the same table the same way, regardless of the node to which the applications/user/administrator connects.	1	
DA 3.2.1.2.3.3.6.	The DAS shall provide the capability for query, update, and transaction transparency.	1	
DA 3.2.1.2.3.4.	**Data Exchange Capabilities**		
DA 3.2.1.2.3.4.1.	The DAS shall provide the capability to exchange graphics and text data between nodes.	3	
DA 3.2.1.2.3.4.2.	The DAS shall provide the capability to transfer data to multiple destinations.	1	
DA 3.2.1.2.3.4.3.	The DAS shall support location transparency of data which allows applications to access data independent of its physical location.	1	
DA 3.2.1.2.3.4.4.	The DAS shall provide the capability for distributed database access and information exchange via all available communications media (e.g. network, floppy disks, tapes, etc.).	2	
DA 3.2.1.2.3.4.5.	The DAS shall provide the capability to support multiple logical database configurations.	1	
DA 3.2.1.2.3.5.	**Transaction Processing by Precedence**		
DA 3.2.1.2.3.5.1.	The DAS shall provide the capability to time stamp database records.	2	
DA 3.2.1.2.3.5.2.	The DAS shall provide the capability to queue all database transactions by precedence and within precedence by time of receipt.	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.1.2.3.5.3.	The DAS shall service each database transaction by precedence and within precedence by time of receipt.	2	
DA 3.2.1.2.3.5.4.	The DAS shall queue undeliverable database updates by precedence and within precedence by time of receipt.	2	
DA 3.2.1.2.3.5.5.	The DAS shall provide the capability to time stamp data fields.	1	
DA 3.2.1.2.3.5.6.	The DAS shall provide the capability to store data records by time slice.	2	
DA 3.2.1.2.3.5.7.	The DAS shall provide the capability to retrieve historical data from data records stored by time slice.	2	
DA 3.2.1.2.3.5.8.	The DAS shall provide the means to assign precedence classes to all information transfers.	2	
DA 3.2.1.2.3.5.9.	The DAS shall assign a default precedence (routine) if no precedence is assigned.	2	
DA 3.2.1.2.3.6.	**Database Replication**		
DA 3.2.1.2.3.6.1.	The DAS shall provide the capability to create replicated databases.	1	
DA 3.2.1.2.3.6.2.	The DAS shall provide the capability to update replicated databases.	1	
DA 3.2.1.2.3.6.3.	The DAS shall provide the capability to delete updates to an instance to replicated databases.	1	
DA 3.2.1.2.3.6.4.	The DAS replication service shall replicate the minimum information necessary to update the database.	2	
DA 3.2.1.2.3.6.5.	The DAS shall provide the capability to ensure replicated database updates are applied based on age of data criteria.	2	
DA 3.2.1.2.3.6.6.	The DAS shall provide the capability to replicate databases in accordance with the security classification or authorization level of the workstations. (Cross reference with the Security Administration SRS).	2	
DA 3.2.1.2.3.6.7.	The DAS shall provide the capability to notify the application when a replicated database update conflict occurs.	1	
DA 3.2.1.2.3.6.8.	The DAS shall provide replication services	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	that should support the replication of database objects to include, but not limited to tables, views, triggers, stored procedures and database user accounts and data within those objects..		
DA 3.2.1.2.3.6.9.	The DAS shall provide conflict resolution services based on a variety of replication processing criteria: time stamp, priority of server, and application defined.	2	
DA 3.2.1.2.3.6.10.	The DAS shall provide the capability to replicate transactions for synchronous databases.	1	
DA 3.2.1.2.3.6.11.	The DAS shall provide the capability to replicate transactions for asynchronous databases.	1	
DA 3.2.1.2.3.6.12.	The DAS shall support a real time forwarded data replication scheme.	2	
DA 3.2.1.2.3.6.13.	The DAS shall provide the interfaces and mechanisms necessary to support a batch replication scheme in which an entire database can be copied in bulk across the network to a replicated location at specified intervals.	1	
DA 3.2.1.2.3.6.14.	The DAS shall provide the capability to request the forwarding of lost transactions from the originating replicate location.	2	
DA 3.2.1.2.3.6.15.	The DAS shall provide the facilities to transparently replicate data among the nodes of the system.	2	
DA 3.2.1.2.3.6.16.	The DAS shall provide a DBMS that manages a distributed database so that table replication occurs in such a manner that it is transparent to the application/user/administrator making changes to the replicated tables.	2	
DA 3.2.1.2.3.6.17.	The DAS shall determine the capability to define business rules to be used to identify instance of rules to be used in a distributed and replicated database environment.	3	
DA 3.2.1.2.3.6.18.	The DAS shall provide the capability to replicate database updates.	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.1.2.3.6.19.	The DAS shall provide the capability to distribute database updates.	1	
DA 3.2.1.2.3.6.20.	The DAS shall provide the capability to replicates only a subset of data in the database or have a different replication scheme for different subsets of data.	2	
DA 3.2.1.2.3.6.21.	The DAS shall provide replication capability to support distribution of data in an unstable tactical network. It shall provide data replication mechanisms to measure data concurrency and synchronize databases as required.	2	
DA 3.2.1.2.3.6.22.	The DAS shall provide the capability to set the update frequency as well as the replication type for replication processing.	2	3.2.1.2.1.21
DA 3.2.1.2.3.6.23.	The DAS shall provide the capability to use a data-dependent distribution method for distributing database updates. (Distribution is determined by record field values.)		
DA 3.2.1.2.3.7.	**Distributed Database Processing**		
DA 3.2.1.2.3.7.1.	The DAS shall provide the capability to forward all database transactions to any available database server on the network capable of servicing the request.	2	
DA 3.2.1.2.3.7.2.	The DAS shall provide the capability to manually override the automatic features.	1	
DA 3.2.1.2.3.7.3.	The DAS shall provide the capability to load spatial databases.	3	
DA 3.2.1.2.3.7.4.	The DAS shall provide the capability to unload spatial databases.	3	
DA 3.2.1.2.3.7.5.	The DAS shall provide the capability to load relational databases.	1	
DA 3.2.1.2.3.7.6.			
DA 3.2.1.2.3.7.7.			
DA 3.2.1.2.3.7.8.			
DA 3.2.1.2.3.7.9.	The DAS internal data distribution interface function shall fully implement open data access standards such as RDA, SQL/CLI, etc.	2	
DA 3.2.1.2.4.	**Data Dictionary Services**		
DA 3.2.1.2.4.1.	The DAS shall provide the capability to	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	provide database dictionary support (e.g. data definition maintenance).		
DA 3.2.1.2.4.2.	The DAS shall provide the capability to compare newly-updated database data to application program-supplied old database data in order to identify changes in data fields within the database.	2	
DA 3.2.1.2.4.3.	The DAS shall provide the capability to create libraries of data.	2	
DA 3.2.1.2.4.4.	The DAS shall provide the capability to modify libraries of data.	2	
DA 3.2.1.2.4.5.	The DAS shall provide the capability to delete libraries of databases on defined source access rights.	2	
DA 3.2.1.2.4.6.	The DAS shall provide the capability to access libraries of data, based on defined source access rights.	2	
DA 3.2.1.2.4.7.	The DAS shall provide the capability to access sequential file data.	1	
DA 3.2.1.2.4.8.	The DAS shall provide the capability to access indexed sequential file data.	1	
DA 3.2.1.2.4.9.	The DAS shall provide the capability to access direct access file data.	1	
DA 3.2.1.2.4.10.	The DAS shall provide data dictionary services through an API, which will provide at a minimum search, display, and update services.	2	
DA 3.2.1.2.4.11.	The DAS shall provide the capability to perform searches of the database.	1	
DA 3.2.1.2.4.12.	The DAS shall provide the capability to perform data retrievals based on key words.	1	
DA 3.2.1.2.4.13.	The DAS shall provide the capability to sort the data based on the contents of any field or set of fields within the database or subset of the database (tables) (i.e. DTG).	1	
DA 3.2.1.2.4.14.	The DAS shall provide a data dictionary for all data definitions accessible from any workstation/client application on the network.	2	
DA 3.2.1.2.4.15.	The DAS shall provide the capability to merge databases.	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.1.2.4.16.	The DAS shall provide naming scheme so that objects throughout a distributed database can be uniquely identified and reference in applications.	1	
DA 3.2.1.2.4.17.	The DAS shall provide the capability to create the data dictionary.	1	
DA 3.2.1.2.4.18.	The DAS shall provide the capability to modify the data dictionary.	1	
DA 3.2.1.2.4.19.	The DAS shall provide the capability to provide access to the data dictionary.	1	
DA 3.2.2.	**Data Administration Requirements**		
DA 3.2.2.1.	**File Administration Requirements**		
DA 3.2.2.1.1.	The DAS shall provide data administration tools for the maintenance of files. These administration functions are required for the general care and good condition of the system.	2	
DA 3.2.2.1.2.	The DAS shall provide the ability to export file(s) over DII COE communication media and optionally notify the client, in accordance (IAW) client set parameters, on completion of the task.	1	
DA 3.2.2.1.3.	The DAS shall provide the ability to import file(s) over DII COE communication media and optionally notify the client, IAW client set parameters, on completion of the task.	1	
DA 3.2.2.1.4.	The DAS shall provide the ability to compress and archive file(s) over DII COE communication media and optionally notify the client, IAW client set parameters, on completion of the task.	1	
DA 3.2.2.1.5.	The DAS shall provide the ability to uncompress and restore file(s) over DII COE communication media and optionally notify the client, IAW client set parameters, on completion of the task..	1	
DA 3.2.2.1.6.	The DAS shall provide a capability to establish file servers (e.g. DCE file servers).	1	
DA 3.2.2.1.7.	The DAS shall provide the capability to enforce the denial or granting of access based on Access Control Lists.	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.2.2.	**Utilities**		
DA 3.2.2.2.1.	The DAS shall provide utilities to aid in the development and debug of COE and Mission applications and the notification of system administration events.	2	
DA 3.2.2.2.2.	The DAS shall provide a capability to dump files. The dumps shall be able to display text and binary files in decimal, octal and hexadecimal format. (Cross reference with Developers Kit).	1	
DA 3.2.2.2.3.	The DAS shall provide a capability to print files. The contents of a file shall be able to be spooled to a printer by users, applications, and software/system developers.	1	
DA 3.2.2.3.	**Database Administration Requirements**		
DA 3.2.2.3.1.	**Database Administration Services Capabilities**		
DA 3.2.2.3.1.1.	The DAS shall provide the capability to view and edit configuration parameters.	1	
DA 3.2.2.3.1.2.	The DAS shall provide the capability to manually override the automatic features.	1	
DA 3.2.2.3.1.3.	The DAS shall provide the capability to allocate and manage database disk storage space.	1	
DA 3.2.2.3.1.4.	The DAS function shall provide a standard Application Programmers Interface (API) to the COTS database administration tools.	2	
DA 3.2.2.3.1.5.	The DAS shall provide a common desktop (GUI) for all COTS/GOTS database administration tools.	2	
DA 3.2.2.3.2.	**Data Exchange Requirements**		
DA 3.2.2.3.2.1.	The DAS shall provide the capability to specify the format for data exchange between nodes.	2	
DA 3.2.2.3.2.2.	The DAS shall provide the capability to specify the format for data exchange between functions.	2	
DA 3.2.2.3.2.3.	The DAS shall provide the capability to specify the format for data exchange between users.	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.2.3.2.4.	The DAS shall provide the capability to specify where and when data is exchanged.	2	
DA 3.2.2.3.3.	**Backup and Restore Requirements**		
DA 3.2.2.3.3.1.	The DAS shall provide the GUI to backup and restore the database.	1	
DA 3.2.2.3.3.2.	The DAS shall provide the capability to direct database auto-updates when databases are being backed up or restored.	2	
DA 3.2.2.3.3.3.	The DAS shall provide the capability to activate or deactivate the database management system itself.	1	
DA 3.2.2.3.3.4.	The DAS shall provide the capabilities for recovery of a corrupted database.	1	
DA 3.2.2.3.3.5.	The DAS shall provide services which support various types of backups, such as full backups, incremental since last backup, and incremental since a specified last modification date.	2	
DA 3.2.2.3.3.6.	The DAS shall enable read and write accesses to continue while backups are being performed.	2	
DA 3.2.2.3.3.7.	The DAS shall permit a node to automatically restore its database from another node.	1	
DA 3.2.2.3.3.8.	The DAS shall, during a restore, allow read and write access to areas not being restored.	1	
DA 3.2.2.3.4.	**Audit Trail Requirements**		
DA 3.2.2.3.4.1.	The DAS shall provide the capability to maintain and view database audit trails.	1	
DA 3.2.2.3.4.2.	The DAS shall provide the capability to audit database operations to include the following: database connects, database disconnects, data definition language (DDL) statements, and data manipulation language (DML) statements.	2	
DA 3.2.2.3.4.3.	The DAS shall provide the capability to activate database auditing.	2	
DA 3.2.2.3.4.4.	The DAS shall provide the capability to deactivate database auditing.	2	
DA 3.2.2.3.4.5.	The DAS shall provide the capability to	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	configure the types of operations to be captured in the audit trail.		
DA 3.2.2.3.4.6.	The DAS shall produce an audit record containing information regarding the user performing the operation, type of operation, object involved in the operation, and data and time of the operation.	2	
DA 3.2.2.3.4.7.	The DAS shall provide the capability to selectively archive the database audit trail by criteria such as: user who performed the operation, type of operation, object acted on, or data and time of operation.	2	
DA 3.2.2.3.4.8.	The DAS shall provide the capability to selectively purge the database audit trail by criteria such as: user who performed the operation, type of operation, object acted on, or data and time of operation.	2	
DA 3.2.2.3.5.	**Database Access and Security Requirements**		
DA 3.2.2.3.5.1.	The DAS shall provide the capability to monitor user access to the database.	1	
DA 3.2.2.3.5.2.	The DAS shall provide the capability to establish and maintain database security (grant permissions). This security access includes the creation, deletion, and modification of database access permissions by user, workstation, or user functional role. Access privileges will include table, view, row and field level access.	2	
DA 3.2.2.3.5.3.	The DAS shall provide the capability to retrieve databases selected by an application program from a remote site workstation provided the requester has access to that database and the workstation to which the data is returned has the same or higher security level authorization.	2	
DA 3.2.2.3.5.4.	The DAS shall provide the capability for the monitoring of optional security relevant events, such as: attempts to change discretionary access controls, and attempts to create, copy, sanitize, purge, or execute	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	databases.		
DA 3.2.2.3.5.5.	The DAS shall provide the capability for the monitoring of optional security relevant events to be suspended.	2	
DA 3.2.2.3.6.	**Discretionary Access Control (DAC)**		
DA 3.2.2.3.6.1.	The DAS shall provide the capability to establish data access controls based on the discretionary access control requirements.		2
DA 3.2.2.3.6.2.	The DAS shall provide the capability to restrict access to files based on the user's identity and on access modes (e.g. read, write, execute).		
DA 3.2.2.3.6.3.	The DAS shall define and control access between named users and named objects (e.g. files and programs).		
DA 3.2.2.3.6.4.	The DAS shall allow users to specify and control sharing objects by named individuals or defined groups of individuals, or by both.		
DA 3.2.2.3.6.5.	The DAS shall, either by explicit user action or by default, protect objects from unauthorized access.		
DA 3.2.2.3.6.6.	The DAS shall be capable of including or excluding access to each object on a per user and on a per group basis.		
DA 3.2.2.3.6.7.	The DAS shall ensure that access permission to an object by users not already possessing access permission shall only be assigned by authorized users (e.g. system administrators).		
DA 3.2.2.3.6.8.	The DAS shall permit a user to grant or revoke to an object only if the user has control permission to that object.		
DA 3.2.2.3.6.9.	The DAS shall be used within the COE to maintain logical separation among users, based on need to know.		
DA 3.2.2.3.7.	**Mandatory Access Control (MAC)**		
DA 3.2.2.3.7.1.	The DAS shall only permit access to classified information to authorized users with a clearance level equal to or higher than the information's assigned classification.		

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.2.3.7.2.	The DAS shall ensure that subjects and objects shall be assigned sensitivity labels that are a combination of classification levels and categories, and the labels shall be used as the basis for mandatory access control decisions.		
DA 3.2.2.3.7.3.	The DAS shall support two or more such security labels.		
DA 3.2.2.3.7.4.	The following requirements shall hold for all accesses between subjects external to the DAS and all objects directly or indirectly accessible by these subjects:		
DA 3.2.2.3.7.4.1.	A subject can read an object only if the classification in the subject's security level is greater than or equal to the classification in the object's security level and the categories in the subject's security level include all the categories in the object's security level.		
DA 3.2.2.3.7.4.2.	A subject can write an object only if the classification in the subject's security level is less than or equal to the classification in the object's security level and all the categories in the subject's security level are included in the categories of the object's security level.		
DA 3.2.2.3.8.	**Sensitivity Labels**		
DA 3.2.2.3.8.1.	The DAS shall use sensitivity labels as the basis for mandatory access control decisions.		
DA 3.2.2.3.8.2.	The DAS sensitivity labels shall accurately represent security levels of the specific subjects or objects with which they are associated.		
DA 3.2.2.3.8.3.	The DAS shall ensure that when data is exported the sensitivity labels shall accurately and unambiguously represent the internal labels and shall be associated with the information being exported.		
DA 3.2.2.4.	**Distributed Database Administration**		
DA 3.2.2.4.1.	**Distributed Database Capabilities**		
DA 3.2.2.4.1.1.	The DAS shall support the ability to determine which logically separate	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	databases exist.		
DA 3.2.2.4.1.2.	The DAS shall provide the capability to create replicated databases.	1	
DA 3.2.2.4.1.3.	The DAS shall provide the capability to load replicated databases.	1	
DA 3.2.2.4.1.4.	The DAS shall provide the capability to store replicated databases.	1	
DA 3.2.2.4.1.5.	The DAS shall provide the capability to update replicated databases.	1	
DA 3.2.2.4.1.6.	The DAS shall provide the capability to activate replicated databases.	1	
DA 3.2.2.4.1.7.	The DAS shall provide the capability to delete replicated databases.	1	
DA 3.2.2.4.1.8.	The DAS shall provide the capability to create databases.	1	
DA 3.2.2.4.1.9.	The DAS shall provide the capability to open a database.	1	
DA 3.2.2.4.1.10.	The DAS shall provide the capability to close a database.	1	
DA 3.2.2.4.1.11.	The DAS shall provide the capability to delete databases.	1	
DA 3.2.2.4.1.12.	The DAS shall provide the capability to purge databases.	2	
DA 3.2.2.4.1.13.	The DAS shall provide the capability to unload relational databases.	1	
DA 3.2.2.4.1.14.	The DAS shall provide the capability to load spatial databases.	3	
DA 3.2.2.4.1.15.	The DAS shall provide the capability to unload spatial databases.	3	
DA 3.2.2.4.1.16.	The DAS shall provide the capability to delete selected database(s) at the request of an application program.	1	
DA 3.2.2.4.1.17.	The DAS shall provide the capability to delete all databases at the request of an application program.	1	
DA 3.2.2.4.1.18.	The DAS shall at the clients request display data elements used across databases.	2	
DA 3.2.2.4.1.19.	The DAS shall provide the capability to create distributed database configuration information.	1	
DA 3.2.2.4.1.20.	The DAS shall provide the capability to	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	maintain distributed database configuration information.		
DA 3.2.2.4.1.21.	The DAS shall provide the capability to distribute the distributed database configuration information.	1	
DA 3.2.2.4.2.	**Database Replication**		
DA 3.2.2.4.2.1.	The DAS shall provide the capability program to define dynamically the database replication scheme.	3	
DA 3.2.2.4.2.2.	The DAS shall provide the capability to dynamically activate the database replication scheme.	3	
DA 3.2.2.4.2.3.	The DAS shall provide the capability to deactivate the database replication scheme.	2	
DA 3.2.2.4.2.4.	The DAS shall provide the capability program to define dynamically the database proponent scheme.	3	
DA 3.2.2.4.2.5.			
DA 3.2.2.4.2.6.	The DAS shall provide the capability program to create mirrored databases of selected operational databases.	2	
DA 3.2.2.4.2.7.	The DAS shall provide the capability program to store mirrored databases of selected operational databases.	2	
DA 3.2.2.4.2.8.	The DAS shall provide the capability for an application program to update mirrored databases of selected operational databases.	2	
DA 3.2.2.4.2.9.	The DAS shall provide the capability program to activate mirrored databases of selected operational databases.	2	
DA 3.2.2.4.2.10.	The DAS shall provide the capability to access mirrored databases of selected operational databases.	2	
DA 3.2.2.4.2.11.	The DAS shall provide the administration tools that need to be developed to support the monitoring of replication status.	2	
DA 3.2.2.4.2.12.	The DAS shall enable/disable database mirroring (to provide non-stop recovery in the event of media failure).	1	
DA 3.2.2.4.2.13.	The DAS shall provide the capability for an application program to dynamically modify	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	the update frequency of replicated databases.		
DA 3.2.2.4.2.14.	The DAS shall provide the capability to store multiple replication schemes.		
DA 3.2.2.4.2.15.	The DAS shall provide the capability to manually synchronize replicated databases.		
DA 3.2.2.4.2.16.	The DAS shall provide notification when the database update delivery time for a database server exceeds a user specified time.		
DA 3.2.2.4.3.	**Distributed Database Updating**		
DA 3.2.2.4.3.1.	The DAS shall provide the capability to determine which databases accept database auto-update messages.	2	
DA 3.2.2.4.3.2.	The DAS shall set the precedence of queues for undeliverable database updates.	2	
DA 3.2.2.4.3.3.	The DAS shall provide the capability to archive database update queues.	2	
DA 3.2.2.4.4.	**Distributed Database Servers**		
DA 3.2.2.4.4.1.	The DAS shall provide the capability to create and maintain database servers.	1	
DA 3.2.2.4.4.2.	The DAS shall direct what database updates are forwarded to addressed database servers once connectivity is established.	1	
DA 3.2.2.4.4.3.	The DAS shall provide the capability to initialize a database server.	1	
DA 3.2.2.4.4.4.	The DAS shall provide the capability to control any data distribution server, (given appropriate access control mechanisms that will ensure that a database administrator at one site cannot easily alter the configuration of another site's database).	2	
DA 3.2.2.4.4.5.	The DAS shall provide the capability to shut down a database server.	1	
DA 3.2.2.5.	**Database Administration Utilities**		
DA 3.2.2.5.1.	**Database Load Utilities**		
DA 3.2.2.5.1.1.	The DAS shall provide the capability to load database files.	1	
DA 3.2.2.5.1.2.	The DAS shall provide the capability to unload database files.	1	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.2.5.1.3.	The DAS shall provide the capability to bulk load data into the database tables.	1	
DA 3.2.2.5.1.4.	The DAS shall provide the capability to selectively populate the database including updates and reloads.	2	
DA 3.2.2.5.2.	**Database Integrity/Consistency Utilities**		
DA 3.2.2.5.2.1.	The DAS shall incorporate utilities to automatically maintain data integrity/consistency among all copies of the same databases that may exist throughout the network.	1	
DA 3.2.2.5.2.2.	The DAS shall incorporate utilities to provide the capability to manually initiate integrity/consistency processing.	1	
DA 3.2.2.5.2.3.	The DAS shall incorporate utilities to provide the capability to manually terminate integrity/consistency processing.	1	
DA 3.2.2.5.3.	**Data Manipulation and Maintenance Utilities**		
DA 3.2.2.5.3.1.	The DAS shall provide the capability to automatically archive some or all of the data captured and processed within the database(s) as specified by the administrator.	1	
DA 3.2.2.5.3.2.			
DA 3.2.2.5.3.3.	The DAS shall provide industry standard data compression capabilities. This includes compression utilities such as pkzip, gzip, pkarc, etc.	2	
DA 3.2.2.5.3.4.	The DAS shall provide the capability to convert data between versions of the database.	1	
DA 3.2.2.5.4.	**Database Administration Configuration Utilities**		
DA 3.2.2.5.4.1.	The DAS shall provide the capability to configure reusable system or database utilities, (that is to provide the capability to generate or configure a site, or its application code, or its database-specific utilities and tailoring them to the site's specific needs).	3	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
DA 3.2.2.6.	**Database Structure Definition and Manipulation**		
DA 3.2.2.6.1.	**Database Structure Requirements**		
DA 3.2.2.6.1.1.	The DAS shall support mechanisms that provide data pertaining to the database configuration and structure.	1	
DA 3.2.2.6.2.	**Database Table Requirements**		
DA 3.2.2.6.2.1.	The DAS shall provide the capability to create tables in the current database.	1	
DA 3.2.2.6.2.2.	The DAS shall provide the capability to modify tables in the current database.	1	
DA 3.2.2.6.2.3.	The DAS shall provide the capability to delete tables in the current database.	1	
DA 3.2.2.6.2.4.	The DAS shall support operations to get data pertaining to the database configuration and structure, i.e., the size of a database, the list of tables in the database, the location of the database, the journalling and optional security monitoring status, etc.	1	
DA 3.2.2.6.3.	**Database Column Requirements**		
DA 3.2.2.6.3.1.	The DAS shall provide the capability to specify columns to be added, modified, and/or deleted within databases.	1	
DA 3.2.2.6.4.	**Database Attribute Requirements**		
DA 3.2.2.6.4.1.	The DAS shall provide the capability to specify attributes to be added, modified, and/or deleted within databases.	2	
DA 3.2.2.6.4.2.	The DAS provides the capability to identify the attributes and attribute characteristics which make up tables within database.	2	
DA 3.2.2.6.4.3.	The DAS shall support the establishment, management, and administration of replication domains defined at the data element (attribute or field) level.	2	
DA 3.2.2.6.5.	**Performance Requirements**		
DA 3.2.2.6.5.1.	The DAS shall provide the capability to backup a database of up to 5 MB to local, non-volatile storage within five minutes on a workstation with active remote sessions.	2	
DA 3.2.2.6.5.2.	The DAS shall provide the capability to restore a database of up to 5 MB from	2	

Requirement/ Paragraph Number	Requirement Description	Prec	Related Requirement Within DAS SRS
	local, non-volatile storage within five minutes on a workstation with active remote sessions.		
DA 3.2.2.6.5.3.	The DAS shall provide tools to enable a database administrator to monitor the performance.		
DA 3.3.	**DATA ACCESS SERVICES EXTERNAL INTERFACE REQUIREMENTS**		
DA 3.4.	**DATA ACCESS SERVICES INTERNAL INTERFACE REQUIREMENTS**		
DA 3.5.	**DATA ACCESS SERVICES INTERNAL DATA REQUIREMENTS**		
DA 3.6.	**ADAPTATION REQUIREMENTS**		
DA 3.6.1.	The operational parameters required for the operations of the DAS are dependent on the COTS RDBMS.		
DA 3.7.	**SAFETY REQUIREMENTS**		
DA 3.8.	**SECURITY AND PRIVACY REQUIREMENTS**		
DA 3.8.1.	The DAS shall ensure that the security mechanisms in the COE are used by the database.	1	
DA 3.8.2.	The DAS shall use the audit mechanisms associated with the COE security services.	2	
DA 3.8.3.	The DAS shall not conflict with the security mechanisms in the COE.		
DA 3.9.	**DATA ACCESS SERVICES ENVIRONMENT REQUIREMENTS**		
DA 3.9.1.	The DAS software shall be portable and required to execute on the following platforms: The HP/UX 9.0;10.0, The SUN SPARC Solaris 2.4 / 2.5, Win NT 4.0, and Win NT 5.0.	1	

DA 4 QUALIFICATION PROVISIONS

COE Software will be qualified through formal validation tests of the SRS level requirements. The Qualification Methods applied to the software shall include test, demonstration, analysis, and inspection (T, D, A, I).

DA 4.1 TEST

A qualification method that is carried out by operation of the item/component/I/F (or some part of the computer S/W configuration item, etc.), and that relies on the collection and subsequent examination of data.

DA 4.2 DEMONSTRATION

A qualification method that is carried out by operation of the item/component/I/F (or some part of the computer S/W configuration item, etc.), and that relies on observable functional operation not requiring the use of elaborate instrumentation or special test equipment.

DA 4.3 ANALYSIS

A qualification method that is carried out by the processing of accumulated data. An example of accumulated data is the compilation of data obtained from other qualification methods. Examples of the processing of accumulated data are interpretations or extrapolations made from the data.

DA 4.4 INSPECTION

A qualification method that is carried out by visual examination, physical manipulation, or measurement to verify that the requirements have been satisfied.

DA 5 REQUIREMENTS TRACEABILITY

TRACEABILIY AVAILABLE UNDER SEPARATE SOURCE.

DA 6 NOTES

DA 6.1 ACRONYMS & ABBREVIATIONS

ACCS	Army Command and Control Systems
AGCCS	Army Global Command and Control System
ANSI	American National Standards Institute
API	Application Programming Interface
ASCII	American Standard Code Information Interchange
ASCII RTF	American Standard Code Information Interchange Rich Text Format
ASRD	AWIS Software Requirements Specification Document
ATCCS	Army Tactical Command and Control Systems
AWIS	Army WWMCCS Information System
CASS	Common ACCS Support Software
CLI	Client Library Interface
CM	Configuration Manager
COE	Common Operating Environment
COTS	Commercial Off-The-Shelf
DA	Data Access
DAC	Discretionary Access Control
DAS	Data Access Service
DBIF	Database Interface
DBMS	Database Management System
DBs	Databases
DATATWG	Data Access Services Technical Working Group
DCE	Distributing Computing Environment
DDL	Data Definition Language
DDS	Data Distribution System
DES	Data Encryption Standard
DID	Data Item Description
DII	Defense Information Infrastructure
DISA	Defense Information Systems Agency
DML	Data Manipulation Language
DoD	Department of Defense
DTG	Date-Time-Group
FIPS PUB	Federal Information Processing Standards Publication
FMWG	File Management Working Group
GCCS	Global Command and Control Systems
GOTS	Government Off-The-Shelf
GUI	Graphical User Interface

HP	Hewlett-Packard
IAW	in accordance with
ID	Identification
I/F	Interface
IF	Intell Fusion
JMCIS	Joint Maritime Command Information System
JOBES	Joint Operation Planning and Execution System
MAC	Mandatory Access Control
Mbs	Megabytes
MCG&I	Mapping, Charting, Geodesy and Imagery
MIL-STD	Military Standard
MSB	Most Significant Bit
OS	Operating System
POSIX	Portable Operating System Interface for Computing Environments
RDA	Remote Database Access
RDBMS	Relational Database Management System
RISC	Reduced Instruction Set Computer
RTF	Rich Text Format
SMM	Systems Management Manual
SQL	Structured Query Language
SRI	Standing Request for Information
SRS	Software Requirements Specification
SSDD	Support Software Design Document
STACCS	Standard Theater Army Command And Control System
S/W	Software
SECTWG	Security Services Technical Working Group
TBD	To Be Determined
WWMCCS	World-Wide Military Command and Control System

DA 6.2 GLOSSARY OF TERMS

Automatically: Indicates processing initiated during execution of other processes, but dependent on information and/or parameters to be generated or supplied to these other processes. The information / parameters may be data dependent, or application dependent, or dependent on a manual process/human intervention. It will include controls qualifying the processing involved.

Business Rule: A narrative description of policies, procedures, or principles within an organization. Business rules can be divided in to four categories: definitions, facts, constraints, and derivations.

> Definitions are business rules that define entities and attributes.
>
> Facts are either links (relationships) between entities or associations between an entity and attributes
>
> Constraints are conditions about the data that must always be true. They are the integrity rules that protect the data in the eventual database.
>
> Derivations are business rules that materialize a new piece of information (often attribute values) from other pieces of information. For example, a mathematical derivation might specify that you can obtain a person's age by subtracting his or her birth date from the current date.

Commit/Rollback: An individual transaction is processed (commit) or discarded (rollback) by the proponent maintainer of the data items involved.

Discretionary Access Controls (DAC): A means of restricting access to objects based on the identity of subjects or groups to which they belong. The controls are discretionary in the sense that a subject with a certain access permission is capable of passing that permission on to any other subject.

Dynamically Generated Processing: Indicates processing initiated during execution of other processes, but dependent upon information and/or parameters to be generated or supplied to these other processes. The information/parameters may be data dependent, or application dependent, or dependent on a manual process/human intervention. It will include controls qualifying the processing involved.

Location Transparency: occurs when the physical location of data is transparent to the applications and users of the database system. For example, a view that joins table data from several databases provides location transparency because the user of the view does not need to know where the data originates from.

Mandatory Access Control (MAC): mediates access to an object based on the clearance level of the subject (user) and the sensitivity label of the object. (These controls are always enforced above any discretionary control implemented by users).

Mirrored Databases: Replication and maintenance of a database on a transaction basis for the purpose of rapid error or failure recovery as supported by the resident COTS RDBMS own system utilities and operating system.

Proponent Scheme: Describes the sites at which databases are replicated and also who owns and has update authority with respect to the data at each site. It refers to proponency at the source and record level.

Remote Data Access (RDA): is an ISO (9579) application layer interoperability standard (protocol and formats) to support access by an application to a (remote) DBMSs over an OSI network. The goal of RDA is to allow interoperability between applications (clients) and databases (servers) of different manufacturers so that an application is able to read and update data in remote databases via well defined standards. RDA defines a set of client and server standards and a mapping of SQL commands to these services. RDA also defines an interface to ISO (transaction processing) two phase commit TP services in the case where updates to multiple remote databases need to be coordinated. RDA does not yet define interoperability between server databases (i.e. it is not yet a standard for distributed database management).

Replication Scheme: Information that precisely identifies DBs, or partitions of DBs, to be copied and/or distributed, replication schedules, and master/remote sites that are to receive the copies.

Spatial DBMS: Geographic information system that organizes and maintains spatial data (i.e. data with graphical attributes) in terms of type, scale, location(s), extent, topology and geometry. Supports queries of spatial data where the selection criteria are defined by spatial attributes.

SRI: A Standing Request For Information (SRI) is a capability in which CASS monitors for the occurrence of conditions established by an application program, and notifies the calling or establishing application program when the conditions are satisfied. An SRI may be one of three types: timer-based, data-based, or message-based.

Transaction Journalling: Individual messages or database transactions are stored in a journal file, which may be a linear log file or a circular file.

DA 7 APPENDIX A

DA 7.1 EXTERNAL PROGRAMMING INTERFACES

The External Interfaces for the DAS SRS are defined as interfaces to non-COE components. Detailed information (as specified in paragraph 3.3 of the Data Item Description DI-IPSC-81433) defining these interfaces will be specified during the design phase of the COE DAS architecture. At this time such detailed information is unavailable.

DA 8 APPENDIX B

DA 8.1 INTERNAL PROGRAMMING INTERFACES

The Internal Interfaces for the DAS SRS are defined as interfaces to COE components. Detailed information (as specified in paragraph 3.4 of the Data Item Description DI-IPSC-81433) defining these interfaces will be specified during the design phase of the COE DAS architecture. At this time such detailed information is unavailable.

The COE components identified to-date are listed below.

DA 8.1.1 MANAGEMENT SERVICES API

It incorporates other interfaces to:

- Network Administration
- System Administration
- Security Administration

DA 8.1.2 DISTRIBUTED SYSTEM SERVICES

DA 8.1.2.1 COMMUNICATIONS SERVICES API

It incorporates other interfaces to:

- Communications
- Network Services

DA 8.1.2.2 DISTRIBUTION AND OBJECT MANAGEMENT SERVICES

It incorporates other interfaces to:

- Distributed Computing Services
- Data Interchange Services

DA 8.1.3 APPLICATION SUPPORT SERVICES

DA 8.1.3.1 PRESENTATION SERVICES

It incorporates other interfaces to:

- Executive Manager
- Multi-Media Support

DA 8.1.4 COMMON SUPPORT APPLICATIONS

It incorporates other interfaces to:

- Office Automation
- Message Processing
- Correlation
- MCG&I
- Alerts
- On-line Help

DA 8.1.5 SOFTWARE DEVELOPMENT SERVICES

It incorporates other interfaces to:

- Developer's Toolkit

DA 9 APPENDIX C

DA 9.1 INTERFACES TO COMMERCIAL PRODUCTS

The Interfaces to Commercial Products for the DAS SRS are identified below. Detailed information (as specified in paragraph 3.3 of the Data Item Description DI-IPSC-81433) defining these interfaces will be specified during the design phase of the COE DAS architecture. At this time such detailed information is unavailable.

The three commercial products or environments identified for the COE are the following Relational Database engines:

- Sybase
- Oracle
- Informix.